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Report 11193
July 1998

GENCORP
AEROJET

Integrated Advanced Microwave Sounding Unit-A (AMSU-A)

Performance Verification Report

METSAT AMSU-A2 Receiver Assembly,

P/N 1356441-1, S/N F02

Contract No. NAS 5-32314
CDRL 208

Submitted to:

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771

Submitted by:

Aerojet
1100 West Hollyvale Street
Azusa, California 91702

Aerojet

Report 11193
July 1998

PERFORMANCE VERICATION TEST REPORT
METSAT AMSU-A2 RECEIVER ASSEMBLY
FOR
INTEGRATED ADVANCED MICROWAVE SOUNDING UNIT-A
(AMSU-A)

CONTRACT NO. NAS5-32314
CDRL PAR 3.3.2.1

JULY 1998

SUBMITTED TO

NATIONAL AERONAUTICS AND SPACE ADMINISTERATION
GODDARD SPACE FLIGHT CENTER
GREENBELT, MARYLAND 20771

SUBMITTED BY

AEROJET ELECTRONIC SYSTEMS PLANT
1100 WST HOLLYVALE STREET
AZUSA, CALIFORNIA 91702

AMSU-A RECEIVER VERIFICATION TEST REPORT

LEVEL OF ASSEMBLY:	**SUBASSEMBLY**
TEST ITEM:	**AMSU-A2 RECEIVER ASSEMBLY** **P/N: 1356441-1, S/N: F02**
TYPE OF HARDWARE:	**METSAT FLIGHT MODEL (FM)**
TYPE OF TEST:	**FUNCTIONAL PERFORMANCE**
VERIFICATION TEST PROCEDURE:	**AE-26002/6A**
TEST FACILITY LOCATION:	**AESP** **AZUSA, CALIFORNIA**

SIGNATURE:

TEST ENGINEER: Ron Kapper for Young MA **DATE:** 7/27/98

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1.0 INTRODUCTION

The AMSU-A receiver subsystem comprises two separated receiver assemblies; AMSU-A1 and AMSU-A2 (P/N 1356441-1). The AMSU-A1 receiver contains 13 channels and the AMSU-A2 receiver 2 channels. The AMSU-A1 receiver assembly is further divided into two parts; AMSU-A1-1 (P/N 1356429-1) and AMSU-A1-2 (P/N 1356409-1), which contain 9 and 4 channels, respectively. Figures 1 and 2 illustrate the functional block diagrams of the AMSU-A1 and AMSU-A2 receivers.

The AMSU-A receiver subsystem stands in between the antenna and signal processing subsystems of the AMSU-A instrument and comprises the RF and IF components from isolators to attenuators as shown in Figures 1 and 2. It receives the RF signals from the antenna subsystem, down-converts the RF signals to IF signals, amplifies and defines the IF signals to proper power level and frequency bandwidth as specified for each channel, and inputs the IF signals to the signal processing subsystem.

The test reports for the METSAT AMSU-A receiver subsystem are prepared separately for the A1 and A2 receivers so that each receiver stands alone during integration of instruments into the spacecraft. This test report presents the test data of the METSAT AMSU-A2 Flight Model No. 2 (FM-2) receiver. The tests are performed per the Acceptance Test Procedure for the AMSU-A Receiver Subsystem, AE-26002/6A. The functional performance tests are conducted either at the component or subsystem level. While the component-level tests are performed over the entire operating temperature range predicted by thermal analysis, the subsystem-level tests are conducted at ambient temperature only.

2.0 REASON FOR TEST

The Acceptance Test Procedure for the AMSU-A Receiver Subsystem, AE-26002/6A, is prepared to describe in detail the configuration of the test setups and how the tests are to be conducted to verify that the receiver subsystem meets the specifications as required either in the AMSU-A Instrument Performance and Operation Specification, S-480-80, or in AMSU-A Receiver Subsystem Specification, AE-26608, derived by the Aerojet System Engineering. Test results that verify the conformance to the specifications demonstrates the acceptability of that particular receiver.

3.0 ACCEPTANCE TEST

The acceptance tests for the AMSU-A receiver subsystem are performed either at the component or subsystem level. The component-level tests are conducted per the Acceptance Test Procedure of each component at supplier's facilities. The subsystem-level tests are conducted per the Acceptance Test Procedure, AE-26002/6A at Aerojet Azusa facility.

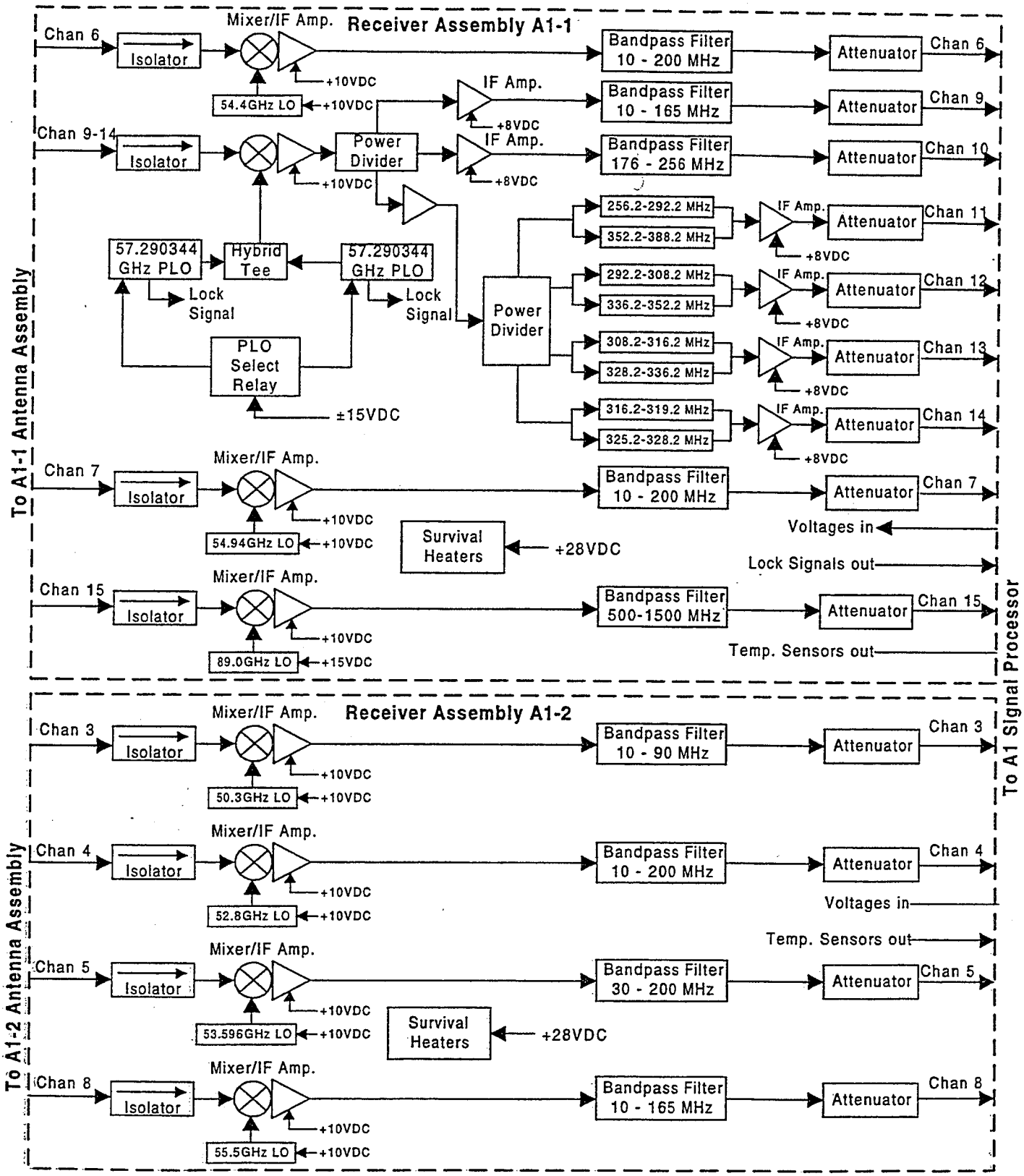


Figure 1. AMSU-A1 Receiver Functional Block Diagram

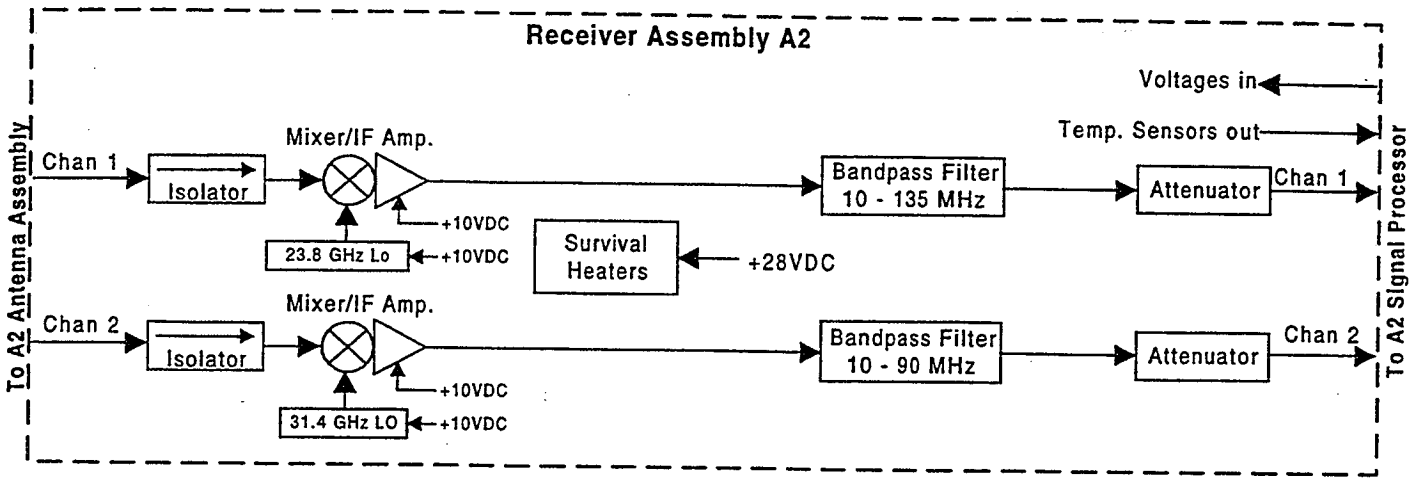


Figure 2. AMSU-A2 Receiver Functional Block Diagram

The component-level tests include the center frequency, center frequency stability, bandpass characteristics, gain stability, and gain compression. Although the bandpass characteristics can change slightly in subsystem level, these performance are mainly dependent on the component characteristics. The subsystem-level tests include the center frequency, IF output power, bandpass characteristics, noise figure, noise power stability, and the tunable short test.

The subsystem-level tests are performed on the AMSU-A2 receiver. However, since the diplexer of the AMSU-A2 system is inseparably integrated to the receiver, the acceptance tests are conducted with the feedhorn directly connected to the diplexer that precedes the receiver. These tests are performed at room ambient temperature only.

Wire connections between the D-sub connectors and platinum resistance temperature (PRT) sensors and thermistors, and D-sub connector and survival heaters through the thermal switches are verified by measuring either the resistances between the respective two pins or the voltages across the two respective pins. The component bias voltages are verified by measuring the voltages across the two respective banana jacks of the breakout box that are connected to corresponding pins of the D-sub connector.

A marginal noise figure of 4.39dB was measured for the channel 1 against the specification of 4.5dB. Channel 1 had employed the mixer/IF amplifier, S/N:7A01, the same unit which failed in the EOS AMSU-A2 receiver testing since no other unit was available at the time of test. Because of this marginal performance, the noise figure of the unit was measured over the operating temperature range. The noise figure was improved to 4.42dB at +40°C but degraded to 5.5dB at -5°C resulting in an out-of-specification condition. This anomaly is addressed in F/AR No. 090. The unit (S/N: 7A01) was subsequently replaced by another (S/N: 7A21). With the replaced mixer/IF amplifier, the pre-detection IF output power was measured to be -27.19dB, a slight decrease from -26.86dB. The noise figure was improved to 3.96 dB. The test data for the 3dB bandpass characteristic, noise figure and noise stability are included in the test report.

Tunable short tests were not performed as they were performed on previous EOS AMSU-A2 receiver.

4.0 ORGANIZATION OF TEST DATA

The test data are organized in the following formats. The test data obtained at the component level are first summarized for each category for all applicable receiver channels. The bandpass characteristics of the filters are summarized only for the data measured at mid-temperature. Supporting component test data over the operating temperature range then follows the summaries. The subsystem-level test data then

follows the component test data. Test data recorded in the test sheet as prepared in the Acceptance Test Procedure and related test plots are included in this test report.

5.0 SUMMARY AND RECOMMENDATIONS

Marginal noise figure was measured for channel 1 at room ambient temperature and the noise figure was degraded at low temperature extreme of -5°C. The same mixer/IF amplifier (S/N: 7A01) had performed poorly in previous EOS AMSU-A2 receiver testing and consequently returned to the supplier for rework. We suspect that the poor noise figure performance is due to different impedance matching at the RF port of the mixer.

With the channel 1 mixer/IF amplifier replaced by another (S/N: 7A21), the METSAT AMSU-A2 FM-2 receiver subsystem successfully passed all performance requirements and was delivered to the System Engineering for system integration and test. The test data indicated adequate margins for all performance specifications.

Only limited trouble-shooting was allowed for the flight hardware with tight delivery schedule. Lack of similar hardware has thus far limited us from conducting sufficient trouble-shooting and subsequent root-cause analyses on above-mentioned anomaly.

6.0 TEST DATA

In the following, the component and subsystem-level test data are organized as delineated in Paragraph 4.0.

COMPONENT-LEVEL TEST DATA

CENTER FREQUENCY AND FREQUENCY STABILITY

FOR

LOCAL OSCILLATORS (LOs)
(DROs)

CENTER FREQUENCY OF LOs

Channel No.	1	2
Specification (GHz)	23.8	31.4
Setting Accuracy (+/-GHz)	0.002	0.002
Measured (GHz)	23.80041	31.39940

FREQUENCY STABILITY OF LOs

Channel No.	1	2
Short-Term Specification (+/-MHz)	8	8
Setting Accuracy (+/-MHz)	2	2
W/ Temp. & Voltage (+/-MHz)	6	6
Measured (MHz) Total	+4.51, -3.03	+0.79, -3.09
Long-Term Specification (+/-MHz)	2	2
By Design or Analysis * (+/-MHz)	0.1	0.1

* Based on accelerated life-test data of DROs.

Channel 1 LO

DRO (P/N: 1336610-1, S/N: 85002)

LITTON
Solid State

TEST DATA SHEET 7.2
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET_____ FINAL DATA SET ✓

LITTON TYPE LS K 9604 CF
SERIAL NUMBER: 85002 QUAL TEST ✓ ACCEPT TEST _____
AESD 1336610-1

Basic Electrical Test: Ref. Test Para. 5.2.2

SPECIFICATION	MEASUREMENT AT Tnom ±1°C	LIMIT
Measurement at Vop=10 VDC		
Temperature	17.4 °C	Table IIIB
Input Voltage	10 VDC	10.0 ± 0.2 VDC
Input Current	69 mA	Table IIIB
Input Power, P_{diss}	.69 W DC	P_{diss} max
Frequency, f_{Tnom}	23.80041 GHz	Table IIIB
RF Output Power, P_{Tnom}	14.6 dBm	12 to 17 dBm
Frequency Setting Accuracy, Δf_S (= f_{Tnom}-F_o)	+.41 MHz	

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.3

Measurement at 9.5 VDC or at 9.5 VDC		
Temperature	17.4 °C	Table IIIB
Input Voltage	10 VDC	9.5 VDC or Para. 5.2.3.2
Input Current	69 mA	Table IIIB
Frequency, f_{meas}	23.80042 GHz	Table IIIB
RF Output Power, P_{meas}	14.6 dBm	12 to 17 dBm
Measurement at 10.5 VDC or at 10.5 VDC		
Temperature	17.4 °C	Table IIIB
Input Voltage	10.5 VDC	10.5 VDC or Para. 5.2.3.3
Input Current	69 mA	Table IIIB
Frequency, f_{meas}	23.80042 GHz	Table IIIB
RF Output Power, P_{meas}	14.6 dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{Tnom}$,

Δf_V at 9.5 VDC or at _____ VDC = +.01 MHz
Δf_V at 10.5 VDC or at _____ VDC = +.01 MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{Tnom}$,

ΔP_V at 9.5 VDC or at _____ VDC = 0 dB
ΔP_V at 10.5 VDC or at _____ VDC = 0 dB

Accept ✓ Reject _____

Test Performed by _____ Date 11-19-97
Litton QA _____ Date NOV 25 1997

LITTON M60

CODE IDENT NO.	SIZE	NUMBER	REV	SHEET 38 OF 68
56348	A	1300823	B3	

LITTON
Solid State

TEST DATA SHEET 7.3
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET _____ FINAL DATA SET ✓

LITTON TYPE LS K 9604CF
SERIAL NUMBER: 85002 QUAL TEST ✓ AESD 1336610- 1 ACCEPT TEST _____

Temperature Testing at T=10°C, Ref. Test Para. 5.2.5.1

SPECIFICATION	MEASUREMENT AT T=10° ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	9.2	°C	10° ± 1°C
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	69	mA	Table IIIB
Input Power, P_{diss}	.69	W DC	Pdiss max
Frequency, $f_{10°C}$	23.80187	GHz	Table IIIB
RF Output Power, $P_{10°C}$	14.4	dBm	12 to 17 dBm

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.5.1

Measurement at 9.5 VDC or at 9.5 VDC			
Temperature	9.2	°C	Table IIIB
Input Voltage	9.5	VDC	9.5 VDC or Para. 5.2.3.2
Input Current	69	mA	Table IIIB
Frequency, f_{meas}	23.80188	GHz	Table IIIB
RF Output Power, P_{meas}	14.4	dBm	12 to 17 dBm
Measurement at 10.5 VDC or at 10.5 VDC			
Temperature	9.2	°C	Table IIIB
Input Voltage	10.5	VDC	10.5 VDC or Para. 5.2.3.3
Input Current	69	mA	Table IIIB
Frequency, f_{meas}	23.80188	GHz	Table IIIB
RF Output Power, P_{meas}	14.4	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{10°C}$:

Δf_V at 9.5 VDC or at _____	VDC =	+.01	MHz
Δf_V at 10.5 VDC or at _____	VDC =	+.01	MHz
Δf_T at 10.0 VDC (=$f_{10°C}$ -f_{Tnom})	=	+1.46	MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{10°C}$:

ΔP_V at 9.5 VDC or at _____	VDC =	ϕ	dB
ΔP_V at 10.5 VDC or at _____	VDC =	ϕ	dB
ΔP_T at 10.0 VDC (=$P_{10°C}$ -P_{Tnom})	=	-.2	dB

Accept ✓ Reject _____

Test Performed by _____ Date 11-19-97
Litton Q.A. _____ Date NOV 25 1997

LITTON M60

LITTON
Solid State

TEST DATA SHEET 7.4
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET _____ FINAL DATA SET ✓

LITTON TYPE LS K 9604 CF
SERIAL NUMBER: 85002 QUAL TEST ✓ AESD 1336610- 1
ACCEPT TEST _____

Temperature Extreme Testing at Tmin, Ref. Test Para. 5.2.5.2

SPECIFICATION	MEASUREMENT AT Tmin ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	-5.3	°C	Table IIIB
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	68	mA	Table IIIB
Input Power, P_{diss}	.68	W DC	Pdiss max
Frequency, f_{Tmin}	23.80383	GHz	Table IIIB
RF Output Power, P_{Tmin}	14.2	dBm	12 to 17 dBm

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.5.2

Measurement at 9.5 VDC or at 9.5 VDC			
Temperature	-5.3	°C	Table IIIB
Input Voltage	DM 10 9.5	VDC	9.5 VDC or Para 5.2.3.2
Input Current	68	mA	Table IIIB
Frequency, f_{meas}	23.80382	GHz	Table IIIB
RF Output Power, P_{meas}	14.2	dBm	12 to 17 dBm
Measurement at 10.5 VDC or at 10.5 VDC			
Temperature	-5.3	°C	Table IIIB
Input Voltage	10.5	VDC	10.5 VDC or Para 5.2.3.3
Input Current	68	mA	Table IIIB
Frequency, f_{meas}	23.80384	GHz	Table IIIB
RF Output Power, P_{meas}	14.2	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{Tmin}$:

Δf_V at 9.5 VDC or at _____	VDC =	-.01	MHz
Δf_V at 10.5 VDC or at _____	VDC =	+.01	MHz
Δf_T at 10.0 VDC (=f_{Tmin} -f_{Tnom})		+3.41	MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{Tmin}$:

ΔP_V at 9.5 VDC or at _____	VDC =	ϕ	dB
ΔP_V at 10.5 VDC or at _____	VDC =	ϕ	dB
ΔP_T at 10.0 VDC (=P_{Tmin} -P_{Tnom})	=	-.4	dB

Accept ✓ Reject _____

Test Performed by DM Date 11-19-97
Litton Q.A. LITTON Date NOV 25 1997

LITTON
Solid State

TEST DATA SHEET 7.5
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET_____ FINAL DATA SET ✓

LITTON TYPE LS K 9604 CF
SERIAL NUMBER: 85002 QUAL TEST ✓ AESD 1336610- 1
ACCEPT TEST _____

Temperature Testing at T=30°C, Ref. Test Para. 5.2.5.3

SPECIFICATION	MEASUREMENT AT T=30° ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	30.5	°C	30° ± 1°C
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	70	mA	Table IIIB
Input Power, P_{diss}	.70	W DC	Pdiss max
Frequency, $f_{30°C}$	23.79937	GHz	Table IIIB
RF Output Power, $P_{30°C}$	14.65	dBm	12 to 17 dBm

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.5.3

Measurement at 9.5 VDC or at 9.5 VDC			
Temperature	30.5	°C	Table IIIB
Input Voltage	9.5	VDC	9.5 VDC or Para. 5.2.3.2
Input Current	70	mA	Table IIIB
Frequency, f_{meas}	23.79935	GHz	Table IIIB
RF Output Power, P_{meas}	14.65	dBm	12 to 17 dBm
Measurement at 10.5 VDC or at 10.5 VDC			
Temperature	30.5	°C	Table IIIB
Input Voltage	10.5	VDC	10.5 VDC or Para. 5.2.3.3
Input Current	70	mA	Table IIIB
Frequency, f_{meas}	23.79937	GHz	Table IIIB
RF Output Power, P_{meas}	14.65	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{30°C}$:

Δf_V at 9.5 VDC or at _____	VDC =	-.02	MHz
Δf_V at 10.5 VDC or at _____	VDC =	Ø	MHz
Δf_T at 10.0 VDC ($=f_{30°C} - f_{Tnom}$)	=	-1.04	MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{30°C}$:

ΔP_V at 9.5 VDC or at _____	VDC =	Ø	dB
ΔP_V at 10.5 VDC or at _____	VDC =	Ø	dB
ΔP_T at 10.0 VDC ($=P_{30°C} - P_{Tnom}$)	=	+.05	dB

Accept ✓ Reject _____

Test Performed by _____ Date 11-19-97
Litton Q.A. _____ Date NOV 25 1997

LITTON NOTED

CODE IDENT NO.	SIZE	NUMBER	REV	SHEET 41 OF 68
56348	A	1300823	B3	

LITTON
Solid State

TEST DATA SHEET 7.6
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET_____ FINAL DATA SET ✓

LITTON TYPE LS R 9604 CF AESD 1336610- 1
SERIAL NUMBER: 85002 QUAL TEST ✓ ACCEPT TEST _____

Temperature Extreme Testing at Tmax, Ref. Test Para. 5.2.5.4

SPECIFICATION	MEASUREMENT AT Tmax ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	40	°C	Table IIIB
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	71	mA	Table IIIB
Input Power, P_{diss}	.71	W DC	Pdiss max
Frequency, f_{Tmax}	23.797 87	GHz	Table IIIB
RF Output Power, P_{Tmax}	14.7	dBm	12 to 17 dBm

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.5.4

Measurement at 9.5 VDC or at 9.5 VDC			
Temperature	40	°C	Table IIIB
Input Voltage	9.5	VDC	9.5 VDC or Para 5.2.3.2
Input Current	71	mA	Table IIIB
Frequency, f_{meas}	23.79788	GHz	Table IIIB
RF Output Power, P_{meas}	14.7	dBm	12 to 17 dBm

Measurement at 10.5 VDC or at 10.5 VDC			
Temperature	40	°C	Table IIIB
Input Voltage	10.5	VDC	10.5 VDC or Para 5.2.3.3
Input Current	71	mA	Table IIIB
Frequency, f_{meas}	23.797 89	GHz	Table IIIB
RF Output Power, P_{meas}	14.7	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{Tmax}$:

Δf_V at 9.5 VDC or at _____	VDC =	+.01	MHz
Δf_V at 10.5 VDC or at _____	VDC =	+.02	MHz
Δf_T at 10.0V (=f_{Tmax} -f_{Tnom})	=	-2.54	MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{Tnom}$:

ΔP_V at 9.5 VDC or at _____	VDC =	∅	dB
ΔP_V at 10.5 VDC or at _____	VDC =	∅	dB
ΔP_T at 10.0 VDC (=P_{Tmax}-P_{Tnom})	=	+.1	dB

Accept ✓ Reject _____

Test Performed by DH Date 11-19-97
Litton Q.A. 09 W LITTON Date NOV 25 1997

CODE IDENT NO.	SIZE	NUMBER	REV	SHEET 42 OF 68
56348	A	1300823	B3	

LITTON
Solid State

TEST DATA SHEET 7.7
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET_____ FINAL DATA SET ✓

LITTON TYPE LS K 9604 CF AESD 1336610- 1
SERIAL NUMBER: 85002 QUAL TEST ✓ ACCEPT TEST _____

Power Supply Immunity, Ref. Test Para. 5.2.4

SPECIFICATION	MEASUREMENT AT Tnom ±1°C		LIMIT
Initial Measurement			
Temperature	17.5	°C	Table IIIB
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	69	mA	Table IIIB
Input Power	.69	W DC	Pdiss max
Frequency (f_{Tnom})	23.80042	GHz	Table IIIB
RF Output Power	14.6	dBm	12 to 17 dBm
Frequency Setting Accuracy, Δf_S (= f_{Tnom}-F_o)	+.42	MHz	

Performance After Short Circuit on Power Supply: Ref Test Para 5.2.4.2

Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	69	mA	Table IIIB
Input Power	.69	W DC	Pdiss max
Frequency	23.80043	GHz	Table IIIB
RF Output Power	14.6	dBm	12 to 17 dBm

Over Voltage: Ref Test Para 5.2.4.3

Overvoltage Input Voltage	28	VDC	+28V

Performance After Input Overvoltage

Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	69	mA	Table IIIB
Input Power	.69	W DC	Pdiss max
Frequency	23.80045	GHz	Table IIIB
RF Output Power	14.6	dBm	12 to 17 dBm

Reverse Polarity: Ref Test Para 5.2.4.4

Reverse Input Voltage	-10	VDC	-10.0 ± 0.2 VDC

Performance After Reverse Input Voltage

Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	69	mA	Table IIIB
Input Power	.69	W DC	Pdiss max
Frequency, f_{Tnom}	23.80047	GHz	Table IIIB
RF Output Power	14.6	dBm	12 to 17 dBm
Frequency Setting Accuracy, Δf_S (= f_{Tnom}-F_o)	+.47	MHz	

Accept ✓ Reject _____

Test Performed by [illegible] Date 11-19-97
Litton Q.A. 09 W NO117 Date NOV 25 1997

LITTON
Solid State

TEST DATA SHEET 7.23B
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET _____ FINAL DATA SET ✓

LITTON TYPE LS K 9604 CF
SERIAL NUMBER: 85002 QUAL TEST ✓
AESD 1336610- 1
ACCEPT TEST _____

Frequency Pulling and Load VSWR 2.5:1 max. all phases. Ref Test Para. 5.9

TEST DESCRIPTION		LIMITS
Output Open and Short. Ref. Test Para. 5.9.5		
Temperature	23.7 °C	24°C ± 5°C
Frequency:	23.80008 GHz	Table IIIB
RF Output Power:	14.6 dBm	12 to 17 dBm
Input Voltage	10 VDC	10 ± 0.2 VDC
Input Current:	70 mA	Table IIIB
Results:	✓ Acceptable	No Damage or Degradation

Calculate maximum Frequency Accuracy (both positive and negative),
$\Delta f_{acc} = \Delta f_S$ (Use worst-case Δf_S from 7.2, 7.7, and 7.22A) + Δf_H (from 7.22A) + Δf_L (from 7.23A):

Maximum Δf_{acc} =	+1.08 MHz (Positive)	Table IIIB
	-.57 SE MHz (Negative)	Table IIIB

Calculate maximum Short-term Frequency Stability (both positive and negative),
$\Delta f_{V+T} = \Delta f_V + \Delta f_T$ (Use worst-case Δf_V and Δf_T from 7.2 thru 7.6):

Maximum Δf_{V+T} =	+3.43 MHz (Positive)	Table IIIB
	-2.56 MHz (Negative)	Table IIIB

Calculate maximum overall RF Output Power Stability (both positive and negative),
$\Delta P_{OV} = \Delta P_V + \Delta P_T$ (Use worst-case ΔP_V and ΔP_T from 7.2 thru 7.6) + ΔP_H (from 7.22A) + ΔP_L (from 7.23A):

Maximum ΔP_{OV} =	+.3 dB (Positive)	1.0 dB
	-.65 dB (Negative)	-1.0 dB

Accept ✓ Reject _____

Test Performed by DH Date 11-22-97

Litton Q.A. _____ Date NOV 25 1997

CODE IDENT NO.	SIZE	NUMBER	REV	SHEET 61 OF 68
56348	A	1300823	B3	

Channel 2 LO

DRO (P/N: 1336610-2, S/N: 85009)

LITTON
Solid State

TEST DATA SHEET 7.2
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET_____ FINAL DATA SET ✓

LITTON TYPE LS A 9635 CF
SERIAL NUMBER: 85009 QUAL TEST _____ AESD 1336610-2
ACCEPT TEST ✓

Basic Electrical Test: Ref. Test Para. 5.2.2

SPECIFICATION	MEASUREMENT AT Tnom ±1°C	LIMIT
Measurement at Vop=10 VDC		
Temperature	17.3 °C	Table IIIB
Input Voltage	10.0 VDC	10.0 ± 0.2 VDC
Input Current	128 mA	Table IIIB
Input Power, P_{diss}	1.28 W DC	P_{diss} max
Frequency, f_{Tnom}	31.399404 GHz	Table IIIB
RF Output Power, P_{Tnom}	14.6 dBm	12 to 17 dBm
Frequency Setting Accuracy, Δf_S (= f_{Tnom}-F_o)	-0.60 MHz	

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.3

Measurement at 9.5 VDC or at _____ VDC		
Temperature	17.2 °C	Table IIIB
Input Voltage	9.5 VDC	9.5 VDC or Para. 5.2.3.2
Input Current	128 mA	Table IIIB
Frequency, f_{meas}	31.399408 GHz	Table IIIB
RF Output Power, P_{meas}	14.6 dBm	12 to 17 dBm
Measurement at 10.5 VDC or at _____ VDC		
Temperature	17.2 °C	Table IIIB
Input Voltage	10.5 VDC	10.5 VDC or Para. 5.2.3.3
Input Current	128 mA	Table IIIB
Frequency, f_{meas}	31.399413 GHz	Table IIIB
RF Output Power, P_{meas}	14.6 dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{Tnom}$,

Δf_V at 9.5 VDC or at _____ VDC = +.004 MHz
Δf_V at 10.5 VDC or at _____ VDC = +.009 MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{Tnom}$,

ΔP_V at 9.5 VDC or at _____ VDC = Φ dB
ΔP_V at 10.5 VDC or at _____ VDC = Φ dB

Accept ✓ Reject _____

Test Performed by _____ Date 11-20-97
Litton QA _____ LITTON M 60 Date ~~NOV 25 1997~~

LITTON
Solid State

TEST DATA SHEET 7.3
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET _____ FINAL DATA SET ✓

LITTON TYPE LS A 9635 CF — AESD 1336610- 2
SERIAL NUMBER: 85009 — QUAL TEST _____ — ACCEPT TEST ✓

Temperature Testing at T=10°C, Ref. Test Para. 5.2.5.1

SPECIFICATION	MEASUREMENT AT T=10° ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	10.3	°C	10° ± 1°C
Input Voltage	10.0	VDC	10.0 ± 0.2 VDC
Input Current	128	mA	Table IIIB
Input Power, P_{diss}	1.28	W DC	Pdiss max
Frequency, $f_{10°C}$	31.399750	GHz	Table IIIB
RF Output Power, $P_{10°C}$	14.7	dBm	12 to 17 dBm

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.5.1

Measurement at 9.5 VDC or at _____ VDC			
Temperature	10.2	°C	Table IIIB
Input Voltage	9.5	VDC	9.5 VDC or Para. 5.2.3.2
Input Current	128	mA	Table IIIB
Frequency, f_{meas}	31.399755	GHz	Table IIIB
RF Output Power, P_{meas}	14.7	dBm	12 to 17 dBm
Measurement at 10.5 VDC or at _____ VDC			
Temperature	10.1	°C	Table IIIB
Input Voltage	10.5	VDC	10.5 VDC or Para. 5.2.3.3
Input Current	128	mA	Table IIIB
Frequency, f_{meas}	31.399762	GHz	Table IIIB
RF Output Power, P_{meas}	14.7	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{10°C}$:

Δf_V at 9.5 VDC or at _____	VDC =	+.005	MHz
Δf_V at 10.5 VDC or at _____	VDC =	+.012	MHz
Δf_T at 10.0 VDC (=$f_{10°C}$ -f_{Tnom})	=	+.346	MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{10°C}$:

ΔP_V at 9.5 VDC or at _____	VDC =	ϕ	dB
ΔP_V at 10.5 VDC or at _____	VDC =	ϕ	dB
ΔP_T at 10.0 VDC (=$P_{10°C}$ -P_{Tnom})	=	+.1	dB

Accept ✓ Reject _____

Test Performed by DM — Date 11-21-97
Litton Q.A. LITTON M 60 — Date NOV 25 1997

CODE IDENT NO.	SIZE	NUMBER	REV	SHEET 39 OF 68
56348	A	1300823	B3	

TEST DATA SHEET 7.4
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET _____ FINAL DATA SET ✓

LITTON TYPE LS A 9635 CF AESD 1336610- 2
SERIAL NUMBER: 85009 QUAL TEST _____ ACCEPT TEST ✓

Temperature Extreme Testing at Tmin, Ref. Test Para. 5.2.5.2

SPECIFICATION	MEASUREMENT AT Tmin ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	-6	°C	Table IIIB
Input Voltage	10.0	VDC	10.0 ± 0.2 VDC
Input Current	127	mA	Table IIIB
Input Power, P_{diss}	1.27	W DC	Pdiss max
Frequency, f_{Tmin}	31.400160	GHz	Table IIIB
RF Output Power, P_{Tmin}	14.8	dBm	12 to 17 dBm

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.5.2

Measurement at 9.5 VDC or at _____ VDC			
Temperature	-6	°C	Table IIIB
Input Voltage	9.5	VDC	9.5 VDC or Para 5.2.3.2
Input Current	127	mA	Table IIIB
Frequency, f_{meas}	31.400160	GHz	Table IIIB
RF Output Power, P_{meas}	14.8	dBm	12 to 17 dBm

Measurement at 10.5 VDC or at _____ VDC			
Temperature	-6	°C	Table IIIB
Input Voltage	10.0	VDC	10.5 VDC or Para 5.2.3.3
Input Current	127	mA	Table IIIB
Frequency, f_{meas}	31.400166	GHz	Table IIIB
RF Output Power, P_{meas}	14.8	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{Tmin}$:

Δf_V at 9.5 VDC or at _____	VDC =	ϕ	MHz
Δf_V at 10.5 VDC or at _____	VDC =	+.006	MHz
Δf_T at 10.0 VDC (=f_{Tmin} -f_{Tnom})		+.756	MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{Tmin}$:

ΔP_V at 9.5 VDC or at _____	VDC =	ϕ	dB
ΔP_V at 10.5 VDC or at _____	VDC =	ϕ	dB
ΔP_T at 10.0 VDC (=P_{Tmin} -P_{Tnom})	=	+.2	dB

Accept ✓ Reject _____

Test Performed by _____ Date 11-21-97
Litton Q.A. _____ Date _____

LITTON M 60
NOV 25 1997

LITTON
Solid State

TEST DATA SHEET 7.5
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET_____ FINAL DATA SET ✓

LITTON TYPE LS A 9635 CF — AESD 1336610- 2
SERIAL NUMBER: 85009 — QUAL TEST _____ — ACCEPT TEST ✓

Temperature Testing at T=30°C, Ref. Test Para. 5.2.5.3

SPECIFICATION	MEASUREMENT AT T=30° ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	29	°C	30° ± 1°C
Input Voltage	10.0	VDC	10.0 ± 0.2 VDC
Input Current	129	mA	Table IIIB
Input Power, P_{diss}	1.29	W DC	Pdiss max
Frequency, $f_{30°C}$	31.398470	GHz	Table IIIB
RF Output Power, $P_{30°C}$	14.7	dBm	12 to 17 dBm

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.5.3

Measurement at 9.5 VDC or at _____ VDC			
Temperature	29	°C	Table IIIB
Input Voltage	9.5	VDC	9.5 VDC or Para. 5.2.3.2
Input Current	129	mA	Table IIIB
Frequency, f_{meas}	31.398482	GHz	Table IIIB
RF Output Power, P_{meas}	14.7	dBm	12 to 17 dBm
Measurement at 10.5 VDC or at _____ VDC			
Temperature	29	°C	Table IIIB
Input Voltage	10.5	VDC	10.5 VDC or Para. 5.2.3.3
Input Current	129	mA	Table IIIB
Frequency, f_{meas}	31.398481	GHz	Table IIIB
RF Output Power, P_{meas}	14.7	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{30°C}$:

Δf_V at 9.5 VDC or at _____	VDC =	+.012	MHz
Δf_V at 10.5 VDC or at _____	VDC =	+.011	MHz
Δf_T at 10.0 VDC ($=f_{30°C} - f_{Tnom}$)	=	-.934	MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{30°C}$:

ΔP_V at 9.5 VDC or at _____	VDC =	∅	dB
ΔP_V at 10.5 VDC or at _____	VDC =	∅	dB
ΔP_T at 10.0 VDC ($=P_{30°C} - P_{Tnom}$)	=	+.1	dB

Accept ✓ Reject _____

Test Performed by _____ LITTON M60 — Date 11-31-97
Litton Q.A. _____ — Date NOV 25 1997

CODE IDENT NO.	SIZE	NUMBER	REV	SHEET 41 OF 68
56348	A	1300823	B3	

TEST DATA SHEET 7.6
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET_____ FINAL DATA SET ✓

LITTON TYPE LS A 9635 CF AESD 1336610- 2
SERIAL NUMBER: 85009 QUAL TEST _____ ACCEPT TEST ✓

Temperature Extreme Testing at Tmax, Ref. Test Para. 5.2.5.4

SPECIFICATION	MEASUREMENT AT Tmax ±1°C		LIMIT
Measurement at Vop=10 VDC			
Temperature	40.7	°C	Table IIIB
Input Voltage	10.0	VDC	10.0 ± 0.2 VDC
Input Current	129	mA	Table IIIB
Input Power, P_{diss}	1.29	W DC	Pdiss max
Frequency, f_{Tmax}	31.397210	GHz	Table IIIB
RF Output Power, P_{Tmax}	14.5	dBm	12 to 17 dBm

Frequency and RF Output Power Variation With Voltage, Ref. Test Para 5.2.5.4

Measurement at 9.5 VDC or at _____ VDC			
Temperature	40.8	°C	Table IIIB
Input Voltage	9.5	VDC	9.5 VDC or Para 5.2.3.2
Input Current	129	mA	Table IIIB
Frequency, f_{meas}	31.397195	GHz	Table IIIB
RF Output Power, P_{meas}	14.5	dBm	12 to 17 dBm
Measurement at 10.5 VDC or at _____ VDC			
Temperature	40.8	°C	Table IIIB
Input Voltage	10.5	VDC	10.5 VDC or Para 5.2.3.3
Input Current	129	mA	Table IIIB
Frequency, f_{meas}	31.397200	GHz	Table IIIB
RF Output Power, P_{meas}	14.5	dBm	12 to 17 dBm

Calculate Frequency Variation, $\Delta f_V = f_{meas} - f_{Tmax}$:

Δf_V at 9.5 VDC or at _____	VDC =	-.015	MHz
Δf_V at 10.5 VDC or at _____	VDC =	-.010	MHz
Δf_T at 10.0V (=f_{Tmax} -f_{Tnom})	=	-2.194	MHz

Calculate RF Output Power Variation, $\Delta P_V = P_{meas} - P_{Tnom}$:

ΔP_V at 9.5 VDC or at _____	VDC =	ϕ	dB
ΔP_V at 10.5 VDC or at _____	VDC =	ϕ	dB
ΔP_T at 10.0 VDC (=P_{Tmax}-P_{Tnom})	=	-.1	dB

Accept ✓ Reject _____

Test Performed by DM Date 11-21-97
Litton Q.A. _____ Date NOV 25 1997

TEST DATA SHEET 7.7
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET_____ FINAL DATA SET ✓

LITTON TYPE LS A 9635 CF AESD 1336610- 2
SERIAL NUMBER: 85009 QUAL TEST _____ ACCEPT TEST ✓

Power Supply Immunity, Ref. Test Para. 5.2.4

SPECIFICATION	MEASUREMENT AT Tnom ±1°C		LIMIT
Initial Measurement			
Temperature	17.1	°C	Table IIIB
Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	128.5	mA	Table IIIB
Input Power	1.28	W DC	Pdiss max
Frequency (f_{Tnom})	31.39937	GHz	Table IIIB
RF Output Power	14.45	dBm	12 to 17 dBm
Frequency Setting Accuracy, Δf_S (= f_{Tnom}-F_o)	-.63	MHz	

Performance After Short Circuit on Power Supply: Ref Test Para 5.2.4.2

Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	128.5	mA	Table IIIB
Input Power	1.28	W DC	Pdiss max
Frequency	31.39936	GHz	Table IIIB
RF Output Power	14.45	dBm	12 to 17 dBm

Over Voltage: Ref Test Para 5.2.4.3

Overvoltage Input Voltage	28	VDC	+28V

Performance After Input Overvoltage

Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	128.5	mA	Table IIIB
Input Power	1.28	W DC	Pdiss max
Frequency	31.39934	GHz	Table IIIB
RF Output Power	14.45	dBm	12 to 17 dBm

Reverse Polarity: Ref Test Para 5.2.4.4

Reverse Input Voltage	-10	VDC	-10.0 ± 0.2 VDC

Performance After Reverse Input Voltage

Input Voltage	10	VDC	10.0 ± 0.2 VDC
Input Current	128.5	mA	Table IIIB
Input Power	1.28	W DC	Pdiss max
Frequency, f_{Tnom}	31.39930	GHz	Table IIIB
RF Output Power	14.45	dBm	12 to 17 dBm
Frequency Setting Accuracy, Δf_S (= f_{Tnom}-F_o)	-.70	MHz	

Accept ✓ Reject _____

Test Performed by _____ Date 11-24-97

Litton Q.A. _____ Date NOV 25 1997

LITTON M68

LITTON
Solid State

TEST DATA SHEET 7.23B
FUNCTIONAL PERFORMANCE TESTS
INITIAL DATA SET _____ FINAL DATA SET ✓

LITTON TYPE LS A 9635 CF — AESD 1336610- 2
SERIAL NUMBER: 85009 — QUAL TEST _____ — ACCEPT TEST ✓

Frequency Pulling and Load VSWR 2.5:1 max. all phases. Ref Test Para. 5.9

TEST DESCRIPTION		LIMITS
Output Open and Short. Ref. Test Para. 5.9.5		
Temperature	22.4 °C	24°C ± 5°C
Frequency:	31.39878 GHz	Table IIIB
RF Output Power:	14.3 dBm	12 to 17 dBm
Input Voltage	10.0 VDC	10 ± 0.2 VDC
Input Current:	129 mA	Table IIIB
Results:	✓ Acceptable	No Damage or Degradation

Calculate maximum Frequency Accuracy (both positive and negative),
$\Delta f_{acc} = \Delta f_S$ (Use worst-case Δf_S from 7.2, 7.7, and 7.22A) + Δf_H (from 7.22A) + Δf_L (from 7.23A):

Maximum Δf_{acc} =	+.02 MHz (Positive)	Table IIIB
	-.884 MHz (Negative)	Table IIIB

Calculate maximum Short-term Frequency Stability (both positive and negative),
$\Delta f_{V+T} = \Delta f_V + \Delta f_T$ (Use worst-case Δf_V and Δf_T from 7.2 thru 7.6):

Maximum Δf_{V+T} =	+.768 MHz (Positive)	Table IIIB
	-2.209 MHz (Negative)	Table IIIB

Calculate maximum overall RF Output Power Stability (both positive and negative),
$\Delta P_{OV} = \Delta P_V + \Delta P_T$ (Use worst-case ΔP_V and ΔP_T from 7.2 thru 7.6) + ΔP_H (from 7.22A) + ΔP_L (from 7.23A):

Maximum ΔP_{OV} =	+.35 dB (Positive)	1.0 dB
	-.25 dB (Negative)	-1.0 dB

Accept ✓ Reject _____

Test Performed by _____ Date 11-24-97

LITTON M 60

Litton Q.A. _____ Date NOV 25 1997

BANDPASS CHARACTERISTICS

FOR

IF FILTERS

3 dB BANDWIDTH OF IF FILTERS

Channel No.	1	2
Specification (MHz)	135	90
3 dB bandwidth (MHz) *	127	82
f_L - f_H (MHz)	8-135	8-90
Measured (MHz)		
3 dB bandwidth (MHz)	125.51	80.35
f_L - f_H (MHz)	8.72-134.23	8.77-89.12

* Actual specifications for IF filters.

Channel 1 Bandpass Filter

IF Filter (S/N: 1331559-6, S/N: P232-002)

APPENDIX F **QUALIFICATION TEST REPORT**

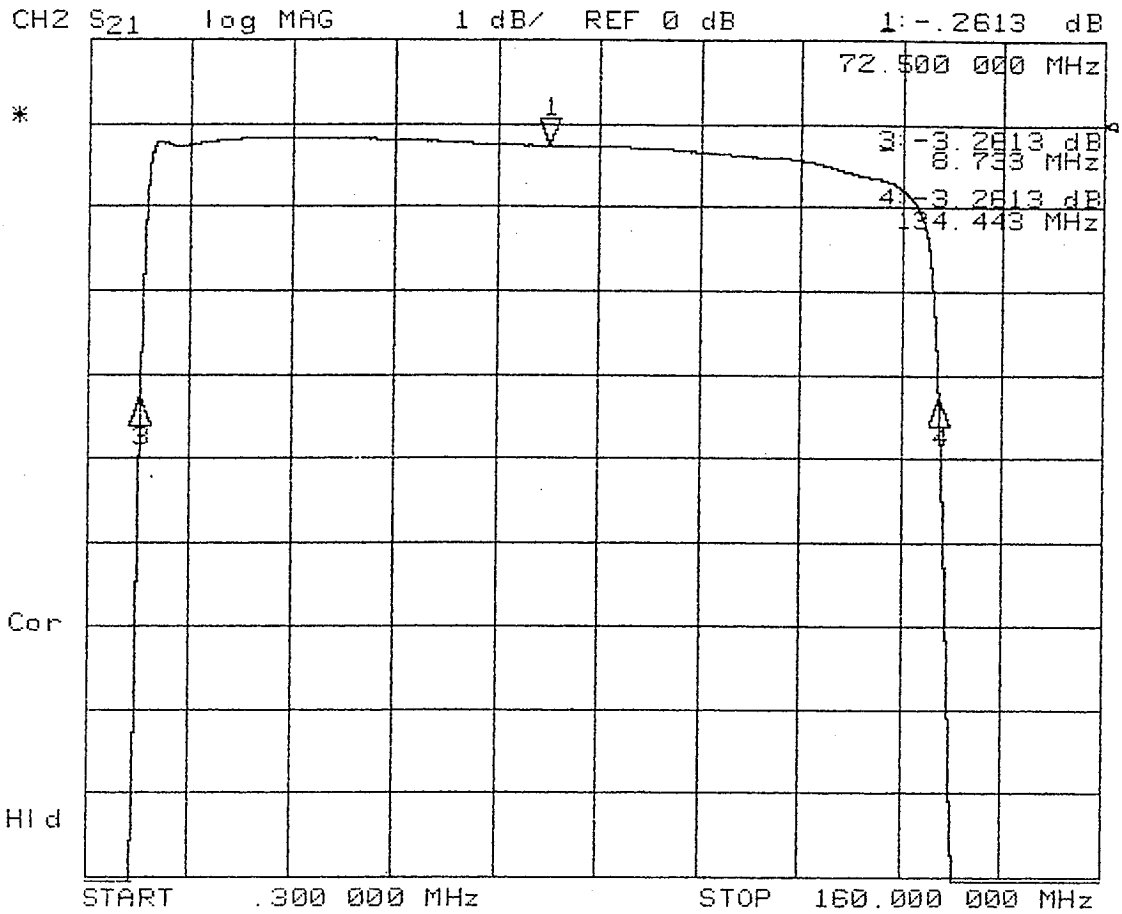
BANDPASS FILTER MODEL HL72.5-125-10SS1 S/N P232-002
AEROJET 1331559-6 REV. E

3.0 dB BANDWIDTH

QUALIFICATION TEST PROCEDURE 63-0005-010 PARA 4.5.3	-10°C	+15°C	+40°C
{7} UPPER 3.0 dB BANDEDGE	134.44 MHz (133.0-135.0)	134.23 Mhz (133.0-135.0)	134.03 MHz (133.0-135.0)
{8} LOWER 3.0 dB BANDEDGE	8.73 MHz (8.0-10.0)	8.72 Mhz (8.0-10.0)	8.70 MHz (8.0-10.0)
{9} 3.0 dB RELATIVE BANDWIDTH	125.71 MHz (123.0-127.0)	125.51 Mhz (123.0-127.0)	125.33 MHz (123.0-127.0)
{10} ADD {7} AND {8} ÷ 2 =	71.59 MHz (72.5 NOM)	71.48 MHz (72.5 NOM)	71.37 Mhz (72.5 NOM)
{10a} RECORD MEASURED TEMPERATURE	-12.6 °C (-15.0 TO -10.0)	+15.0 °C (12.5 TO 17.5)	+42.9 °C (40.0 TO 45.0)
{6} ATTACH TRANSMISSION LOSS PERFORMANCE X-Y PLOT	✓ (√)	✓ (√)	✓ (√)

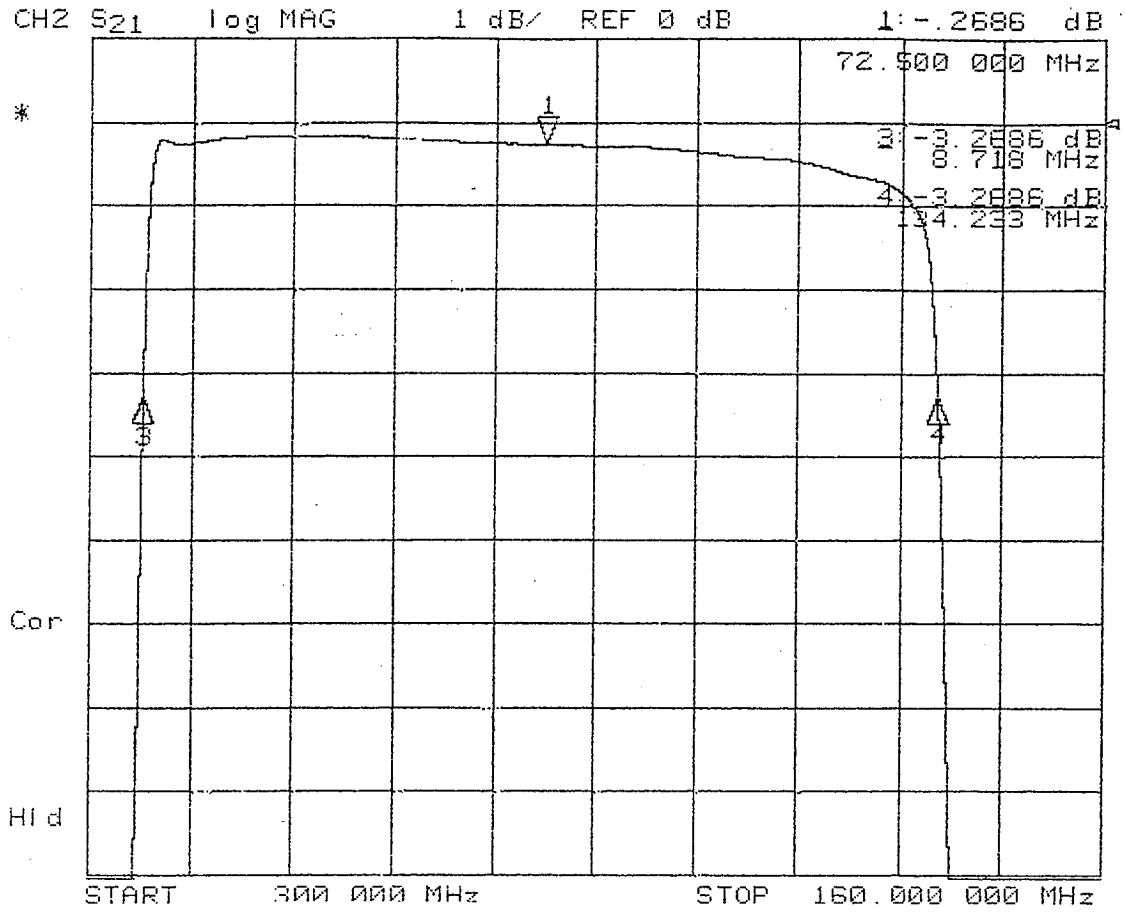
PASSBAND RIPPLE

QUALIFICATION TEST PROCEDURE 63-0005-010 PARA 4.5.4	-10°C	+15°C	+40°C
{11a} MIN INSERTION LOSS FREQ	32.64 MHz	32.64 Mhz	30.24 MHz
MIN INSERTION LOSS PERFORMANCE	-0.16 dB	-0.16 dB	-0.17 dB
{11b} 75% BW LOWER BANDEDGE FREQ	10.33 MHz	10.26 Mhz	10.25 MHz
75% BW LOWER BANDEDGE I.L. PERF	-0.39 dB	-0.41 dB	-0.43 dB
{11c} 75% BW UPPER BANDEDGE FREQ	104.08 MHz	104.01 Mhz	104.00 MHz
75% BW UPPER BANDEDGE I.L. PERF	-0.39 dB	-0.41 dB	-0.43 dB
{11d} PERFORMANCE DELTA (I.L. @ {11b} - I.L. @ {11a})	0.23 dB	0.25 dB	0.26 dB
{11e} PERFORMANCE DELTA (I.L. @ {11c} - I.L. @ {11a})	0.23 dB	0.25 dB	0.26 dB



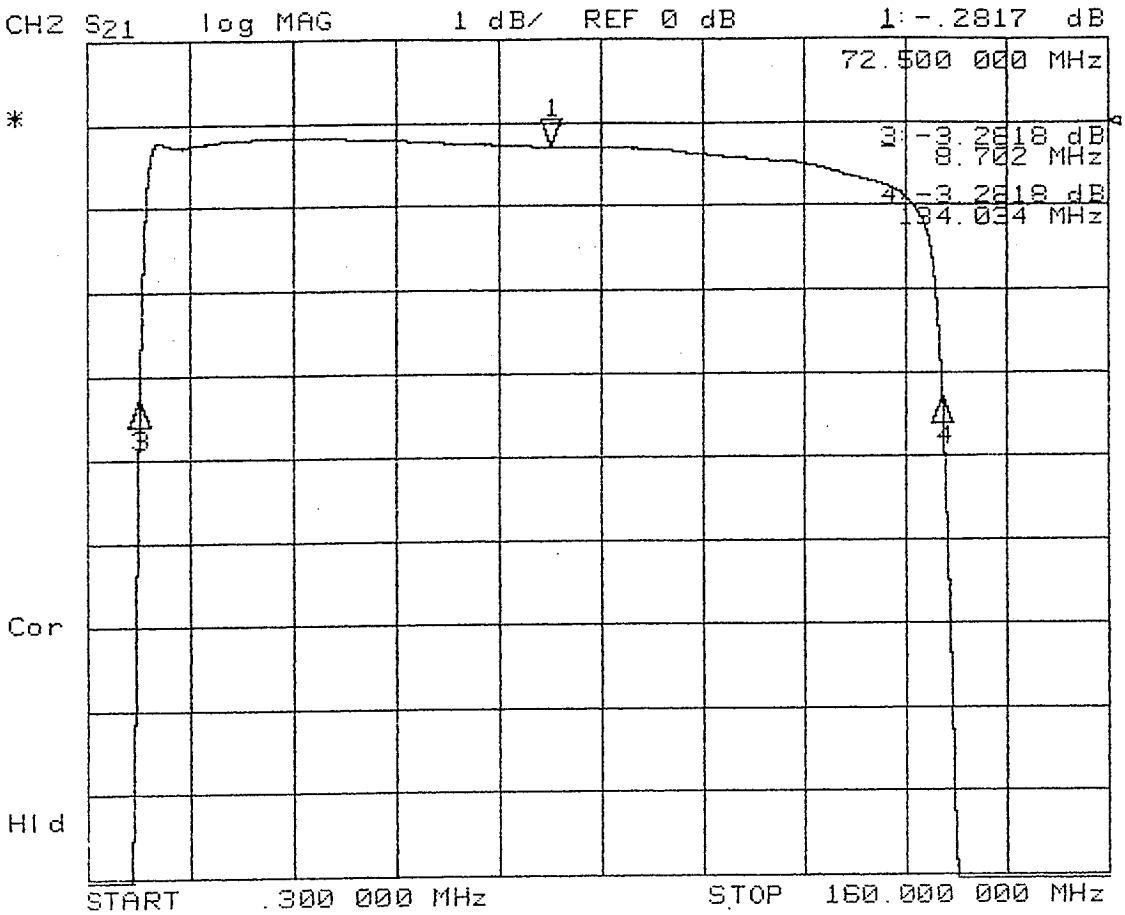
FINAL FUNCTIONAL PERFORMANCE
TRANSMISSION LOSS
SERIAL NO. P232-002
-10C DATA
OPR: R. HOGGATT DATE 11/25/96

MARKER PARAME...	...annel 1	...annel 2
MARKER 1	16.250000 MHz OFF	72.500000 MHz -.2613 dB
MARKER 2	128.750000 MHz OFF	71.588180 MHz OFF
MARKER 3	25.625000 MHz OFF	8.733006 MHz -3.2613 dB
MARKER 4	119.375000 MHz OFF	134.443355 MHz -3.2613 dB
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	89.425802 MHz -3.2342 dB
REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-14 dB	-3 dB
MARKER WIDTH VALUE	-3 dB OFF	-3 dB OFF
MARKER TRACKING	OFF	OFF



FINAL FUNCTIONAL PERFORMANCE
TRANSMISSION LOSS
SERIAL NO. P232-002
+15C DATA
OPR: R. HOGGATT DATE 11/25/96

MARKER PARAMETERS	Channel 1	Channel 2
MARKER 1	16.250000 MHz OFF	72.500000 MHz -.2686 dB
MARKER 2	128.750000 MHz OFF	71.475766 MHz OFF
MARKER 3	25.625000 MHz OFF	8.718196 MHz -3.2686 dB
MARKER 4	119.375000 MHz OFF	134.233336 MHz -3.2686 dB
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	89.425802 MHz -3.2342 dB
REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-14 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF



FINAL FUNCTIONAL PERFORMANCE
TRANSMISSION LOSS
SERIAL NO. P232-002
+40C DATA
OPR: R. HOGGATT DATE 11/25/96

MARKER PARAME...	...nnel 1	...nnel 2
MARKER 1	16.250000 MHz OFF	72.500000 MHz -.2817 dB
MARKER 2	128.750000 MHz OFF	71.368297 MHz OFF
MARKER 3	25.625000 MHz OFF	8.702047 MHz -3.2818 dB
MARKER 4	119.375000 MHz OFF	134.034548 MHz -3.2818 dB
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	89.425802 MHz -3.2342 dB

REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-14 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF

APPENDIX F **QUALIFICATION TEST REPORT**

BANDPASS FILTER MODEL HL72.5-125-10SS1 S/N P232-002
AEROJET 1331559-6 REV. E

PASSBAND RIPPLE (CON'T)

{11f} RECORD PASS/FAIL (0.5 dB MAX)	(PASS)/FAIL	(PASS)/FAIL	(PASS)/FAIL
{11g) ATTACH PASSBAND RIPPLE PERFORMANCE X-Y PLOT(S)	✓ (√)	✓ (√)	✓ (√)

OUT-OF-BAND REJECTION

QUALIFICATION TEST PROCEDURE 63-0005-010 PARA 4.5.5 Fc=72.5 MHz. REF {5A} FOR INSERTION LOSS @ Fc	-10°C	+15°C	+40°C
{12} WORST CASE REJECTION FROM 0.300 MHz TO 1.0 MHz	>100 dB (40.0 dB MIN)	>100 dB (40.0 dB MIN)	>100 dB (40.0 dB MIN)
{13a} WORST CASE REJECTION FROM 153.75 MHz TO 1000.0 MHz	-67.3 dB (40.0 dB MIN)	-68.4 dB (40.0 dB MIN)	-69.4 dB (40.0 dB MIN)
{13c} RECORD MEASURED TEMPERATURE	-12.9 °C (-15.0 TO -10.0)	+15.1 °C (12.5 TO 17.5)	+43.0°C (40.0 TO 45.0)
{14} ATTACH REJECTION PERFORMANCE X-Y PLOT(S)	✓ (√) ✓ (√)	✓ (√) ✓ (√)	✓ (√) ✓ (√)

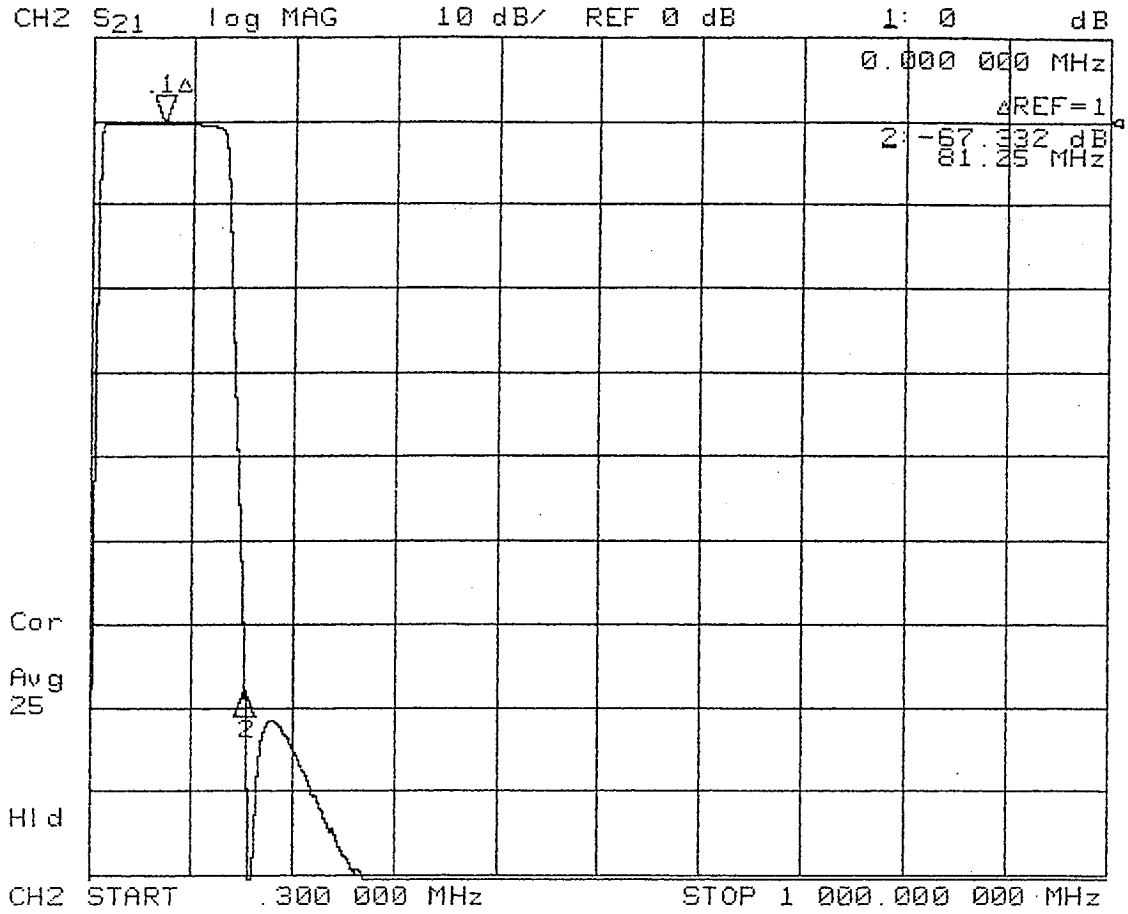
TEST PERFORMED BY R. HOGGATT DATE 11/25/96 (DA 5)

NOTE IF TEST WITNESSED BY AESD: _____ GSI: _____ → NOT WITNESSED THIS TIME (DO)

***** END OF FUNCTIONAL PERFORMANCE TEST ****

OUTLINE AND MOUNTING DIMENSIONS VERIFICATION
{16} REFERENCE CUSTOMER DRAWING 1331559

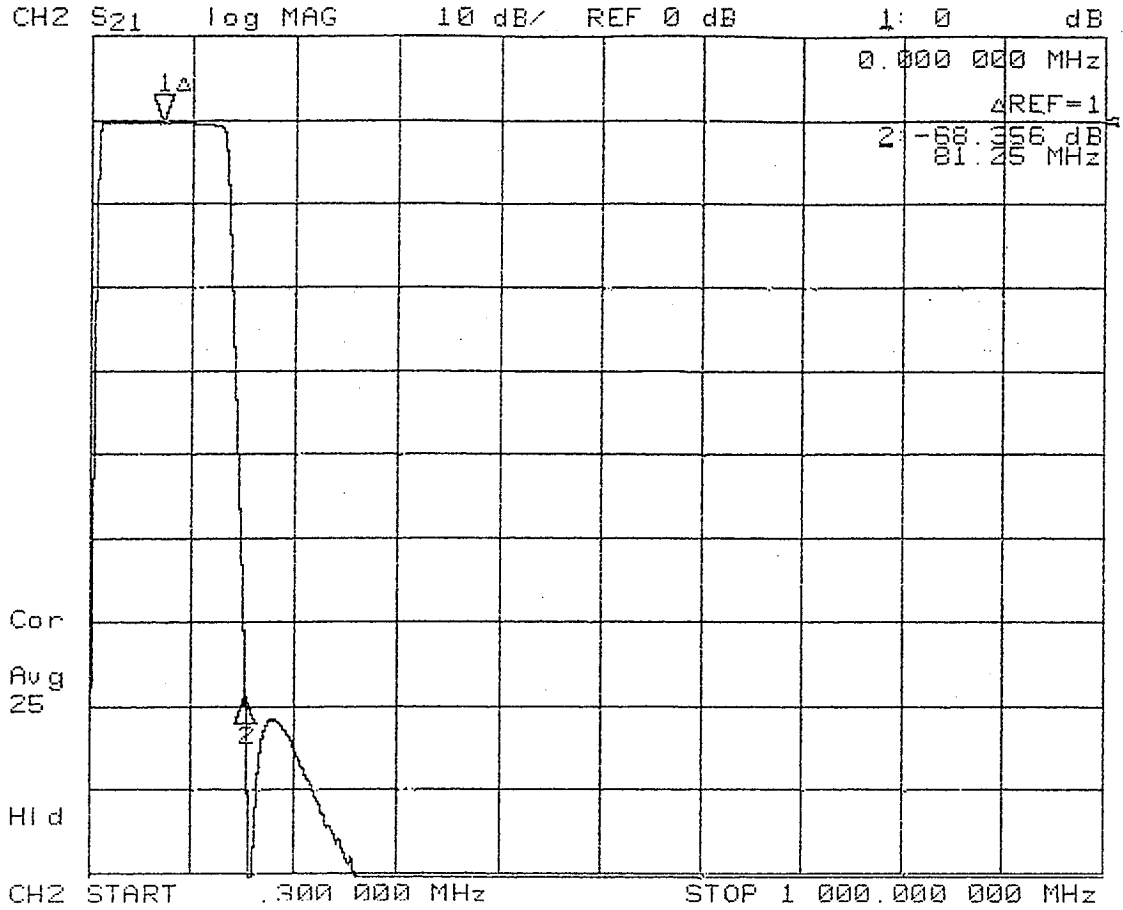
DESCRIPTION OF MEASUREMENT	DIMENSION AND TOLERANCE	ACTUAL MEASUREMENT
OVER ALL LENGTH	3.50 ± .03	3.501
MOUNTING HOLE CENTER	0.125 ± .010	.125
BETWEEN UPPER MOUNTING HOLES	3.250	3.250
BETWEEN LOWER MOUNTING HOLES	3.250	3.249



FINAL FUNCTIONAL PERFORMANCE
REJECTION PERFORMANCE
SERIAL NO. P232-002
-10C DATA
OPR: R. HOGGATT DATE 11/25/96

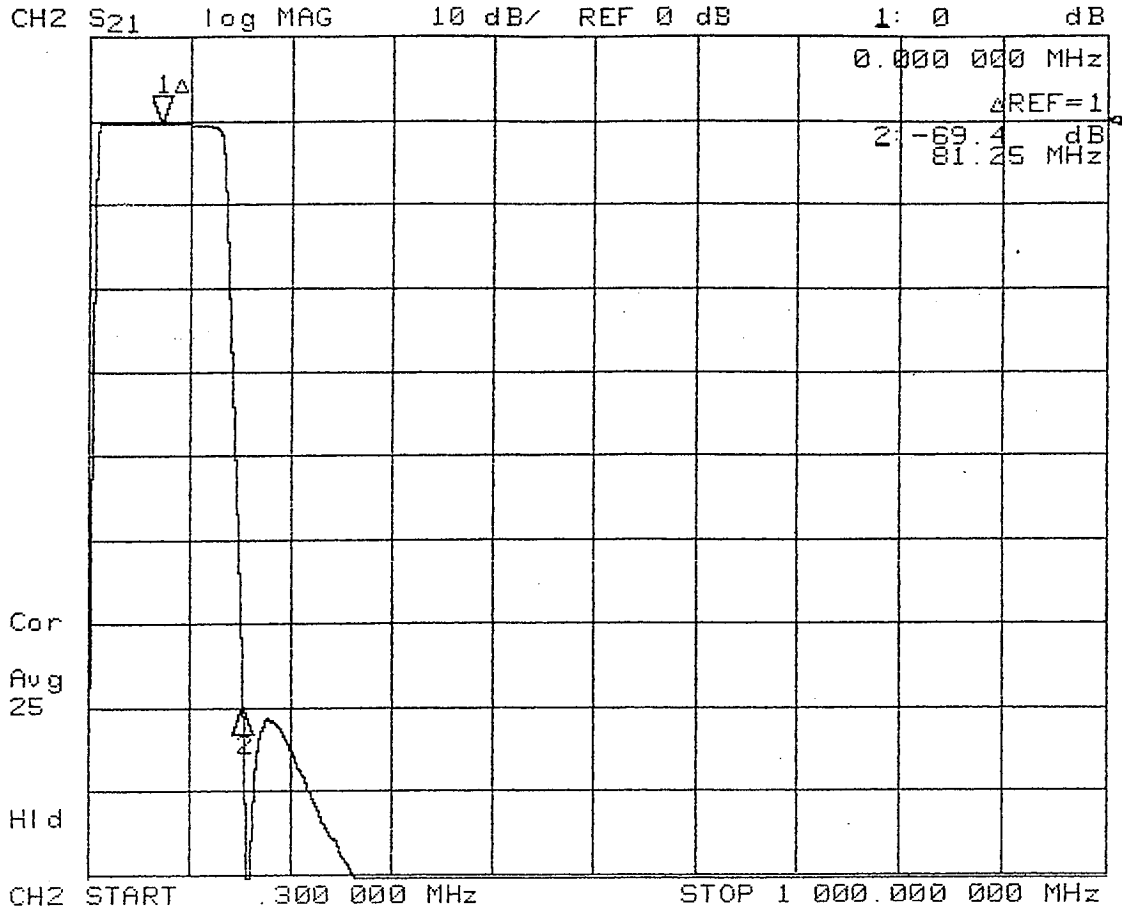
MARKER PARAME...	...annel 1	...annel 2
MARKER 1	1.000000 MHz OFF	72.500000 MHz 0 dB
MARKER 2	5.000000 MHz OFF	153.750000 MHz -67.332 dB
MARKER 3	5.000000 MHz OFF	153.750000 MHz OFF
MARKER 4	5.000000 MHz OFF	1000.000000 MHz OFF
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	0.000000 MHz 0 dB

REFERENCE MARKER	OFF	MARKER 1
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-3 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF



FINAL FUNCTIONAL PERFORMANCE
REJECTION PERFORMANCE
SERIAL NO. P232-002
+15C DATA
OPR: R. HOGGATT DATE 11/25/96

MARKER PARAMETERS	Channel 1	Channel 2
MARKER 1	1.000000 MHz	72.500000 MHz
	OFF	0 dB
MARKER 2	5.000000 MHz	153.750000 MHz
	OFF	-68.356 dB
MARKER 3	5.000000 MHz	153.750000 MHz
	OFF	OFF
MARKER 4	5.000000 MHz	1000.000000 MHz
	OFF	OFF
MKR STIMULUS OFFSET	0.000000 MHz	0.000000 MHz
	0 dB	0 dB
REFERENCE MARKER	OFF	MARKER 1
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-3 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF



FINAL FUNCTIONAL PERFORMANCE
REJECTION PERFORMANCE
SERIAL NO. P232-002
+40C DATA
OPR: R. HOGGATT DATE 11/25/96

MARKER PARAMETERS	Channel 1	Channel 2
MARKER 1	1.000000 MHz OFF	72.500000 MHz 0 dB
MARKER 2	5.000000 MHz OFF	153.750000 MHz -69.4 dB
MARKER 3	5.000000 MHz OFF	153.750000 MHz OFF
MARKER 4	5.000000 MHz OFF	1000.000000 MHz OFF
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	0.000000 MHz 0 dB
REFERENCE MARKER	OFF	MARKER 1
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-3 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF

APPENDIX F **QUALIFICATION TEST REPORT**

BANDPASS FILTER MODEL HL72.5-125-10SS1 S/N P232-002
AEROJET 1331559-6 REV. E

BANDPASS CHARACTERISTICS MEASUREMENT
PER QTP PARA 4.6
(REF: AE-24687, PARA 4.8.2)

RECORD THE AMBIENT ROOM TEMPERATURE. ±22.3°C (+19°C TO +29.0°C)

{15} ATTACH PASSBAND PERFORMANCE X-Y PLOT ✓ (√)

{24} TEST POINT MATRIX

REF	FREQ	UNIT	VALUE	REF	FREQ	UNIT	VALUE
F1	0.5	MHz	-102.0 dB	F11	(*) 80.0	MHz	-0.31 dB
F2	1.0	MHz	-94.6 dB	F12	(*) 100.0	MHz	-0.46 dB
F3	5.0	MHz	-30.9 dB	F13	120.0	MHz	-0.62 dB
F4	7.5	MHz	-9.88 dB	F14	130.0	MHz	-1.02 dB
F5	10.0	MHz	-0.94 dB	F15	135.0	MHz	-4.89 dB
F6	15.0	MHz	-0.30 dB	F16	140.0	MHz	-20.8 dB
F7	25.0	MHz	-0.22 dB	F17	150.0	MHz	-53.4 dB
F8	(*) 45.0	MHz	-0.18 dB	F18	200.0	MHz	-74.7 dB
F9	(*) 65.0	MHz	-0.26 dB	F19	500.0	MHz	-99.5 dB
F10	72.5	MHz	-0.31 dB	F20	1000.0	MHz	-104.4 dB

TEST PERFORMED BY: R. HOGGATT DATE 11/25/96 (DA 5)

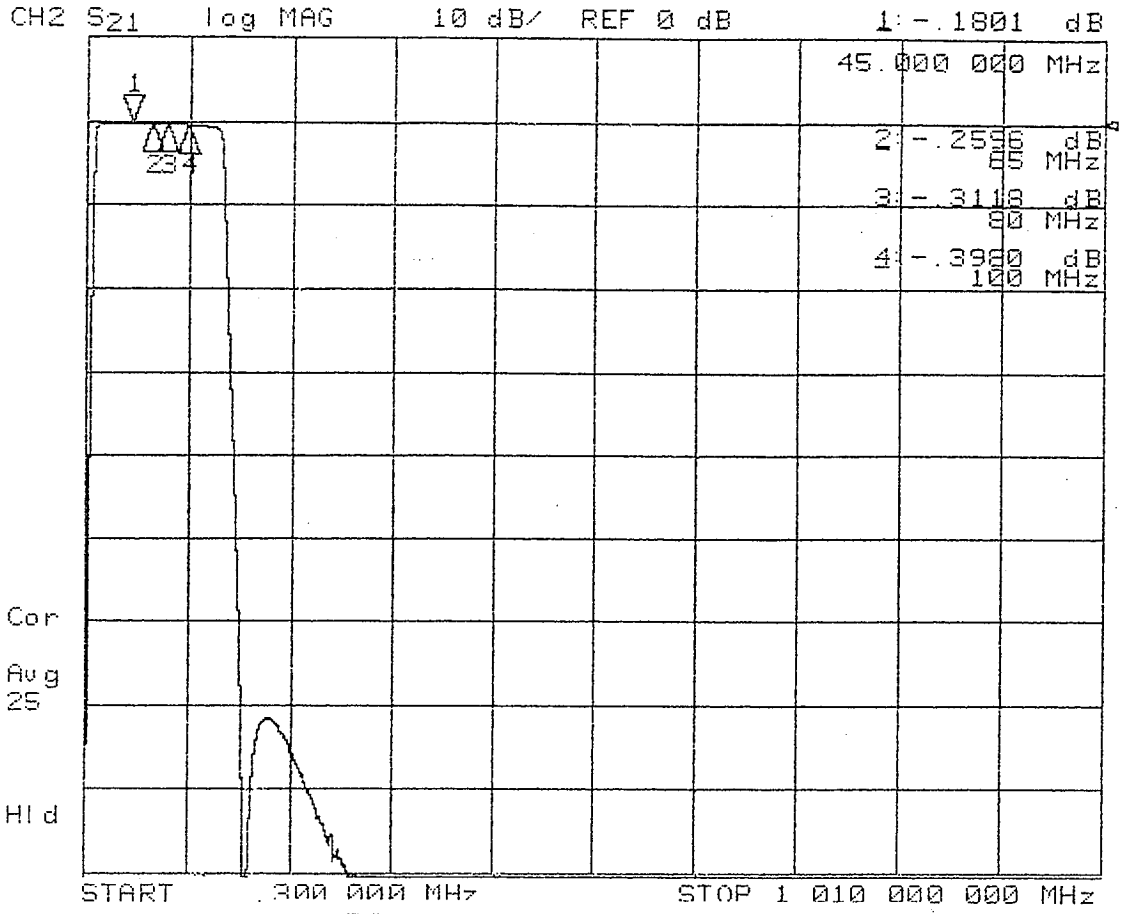
NOTE IF TEST WITNESSED BY AESD _____ GSI _____ > NOT WITNESSED THIS TIME (DV)

***** END OF BANDPASS CHARACTERISTICS TEST *****

FUNCTIONAL PERFORMANCE TEST
QUALIFICATION TEST PROCEDURE
63-0005-010 PARA 4.1

BRIEF TEST DESCRIPTION: THE TESTS DESCRIBED IN APPENDIX F PAGE 10 THRU PAGE 13 ARE PERFORMED TO DOCUMENT THE FUNCTIONAL PERFORMANCE OF THE UNIT AT THE CONCLUSION OF ALL ENVIRONMENTAL TESTING. THE TESTS ARE AS FOLLOWS AND IN ANY SEQUENCE:

a.) VSWR PER QTP PARA 4.5.1.
b.) INSERTION LOSS PER QTP PARA 4.5.2
c.) INSERTION LOSS VS TEMPERATURE PER QTP PARA 4.5.6.
d.) 3.0 dB BANDWIDTH PER QTP PARA 4.5.3.
e.) CENTER FREQUENCY (fc) PER QTP PARA 4.5.7 (PART OF 3.0 dB B/W TEST)
f.) PASSBAND RIPPLE PER QTP PARA 4.5.4 (PART OF INSERTION LOSS TEST).
g.) OUT-OF-BAND REJECTION PER QTP PARA 4.5.5.



POST THERMAL CYCLE
PASSBAND CHARACTERISTICS
SERIAL NO. P232-002
AMBIENT
OPR: R. HOGGATT DATE 11/25/96

MARKER PARAMETERS	Channel 1	Channel 2
MARKER 1	16.250000 MHz OFF	45.000000 MHz -.1801 dB
MARKER 2	128.750000 MHz OFF	65.000000 MHz -.2596 dB
MARKER 3	25.625000 MHz OFF	80.000000 MHz -.3118 dB
MARKER 4	119.375000 MHz OFF	100.000000 MHz -.3980 dB
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	89.425802 MHz -3.2342 dB
REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-14 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF

Channel 2 Bandpass Filter

IF Filter (S/N: 1331559-3, S/N: P229-005)

APPENDIX C **ACCEPTANCE TEST REPORT**

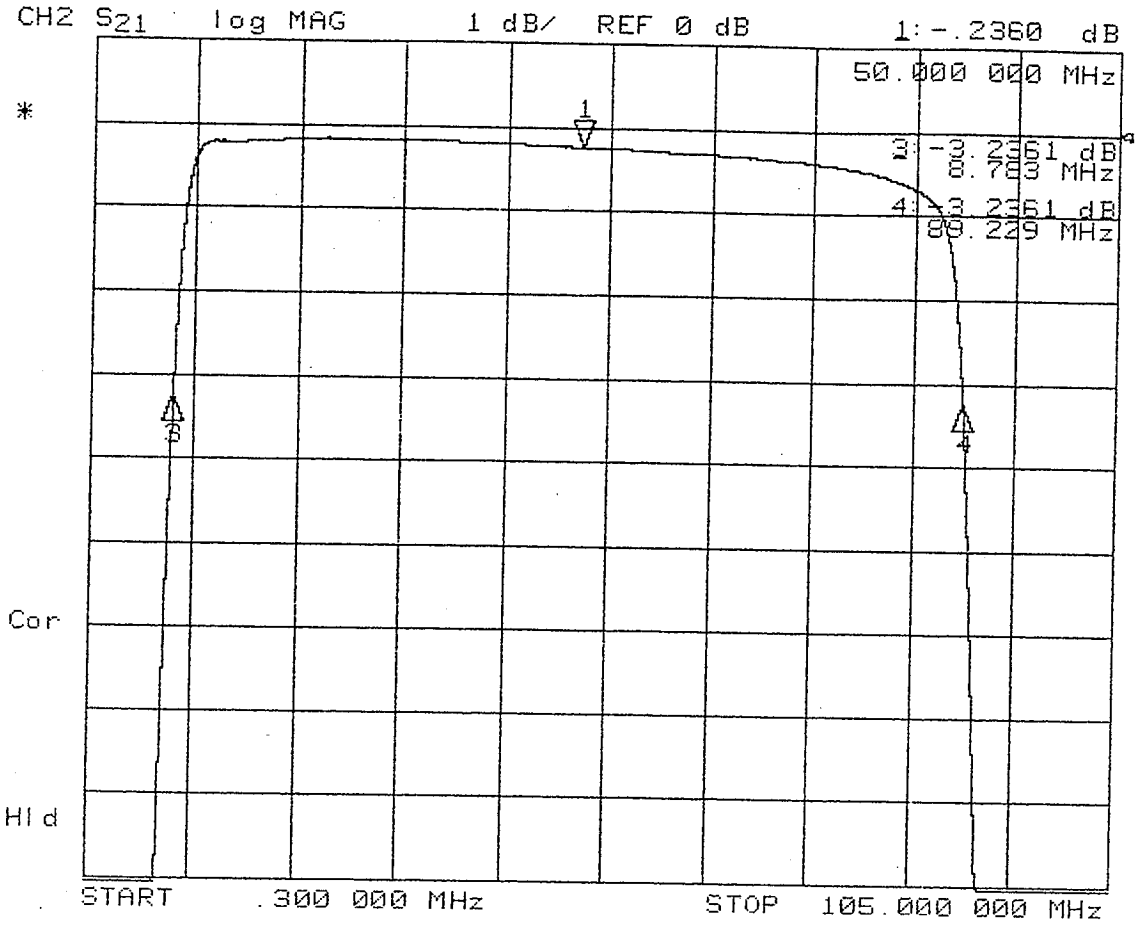
BANDPASS FILTER MODEL HL50-80-10SS1 S/N P229-005
AEROJET 1331559-3 REV. E

3.0 dB BANDWIDTH

ACCEPTANCE TEST PROCEDURE 63-0005-02 PARA 4.5.3	-10°C	+15°C	+40°C
{7} UPPER 3.0 dB BANDEDGE	89.23 MHz (88.0-90.0)	89.12 Mhz (88.0-90.0)	88.98 MHz (88.0-90.0)
{8} LOWER 3.0 dB BANDEDGE	8.78 MHz (8.0-10.0)	8.77 Mhz (8.0-10.0)	8.76 MHz (8.0-10.0)
{9} 3.0 dB RELATIVE BANDWIDTH	80.45 MHz (78.0-82.0)	80.35 Mhz (78.0-82.0)	80.22 MHz (78.0-82.0)
{10} ADD {7} AND {8} ÷ 2 =	49.01 MHz (50.0 NOM)	48.95 MHz (50.0 NOM)	48.87 Mhz (50.0 NOM)
{10a} RECORD MEASURED TEMPERATURE	-13.4 °C (-15.0 TO -10.0)	+14.0 °C (12.5 TO 17.5)	+43.8 °C (40.0 TO 45.0)
{6} ATTACH TRANSMISSION LOSS PERFORMANCE X-Y PLOT	✓ (√)	✓ (√)	✓ (√)

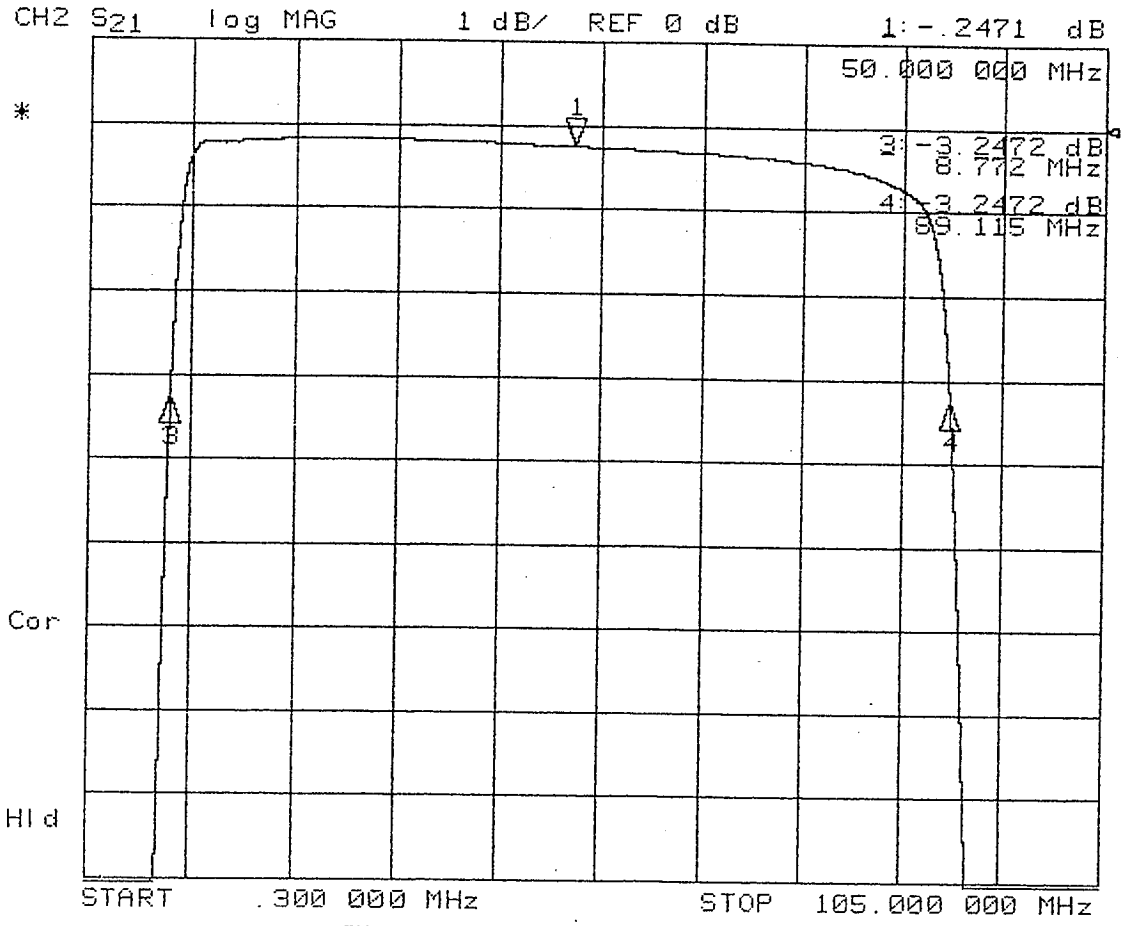
PASSBAND RIPPLE

ACCEPTANCE TEST PROCEDURE 63-0005-02 PARA 4.5.4	-10°C	+15°C	+40°C
{11a} MIN INSERTION LOSS FREQ	23.86 MHz	24.90 Mhz	27.26 MHz
MIN INSERTION LOSS PERFORMANCE	-0.16 dB	-0.17 dB	-0.17 dB
{11b} 75% BW LOWER BANDEDGE FREQ	10.94 MHz	10.85 Mhz	10.75 MHz
75% BW LOWER BANDEDGE I.L. PERF	-0.36 dB	-0.38 dB	-0.40 dB
{11c} 75% BW UPPER BANDEDGE FREQ	70.94 MHz	70.85 Mhz	70.75 MHz
75% BW UPPER BANDEDGE I.L. PERF	-0.36 dB	-0.38 dB	-0.40 dB
{11d} PERFORMANCE DELTA (I.L. @ {11b} - I.L. @ {11a})	0.20 dB	0.21 dB	0.23 dB
{11e} PERFORMANCE DELTA (I.L. @ {11c} - I.L. @ {11a})	0.20 dB	0.21 dB	0.23 dB



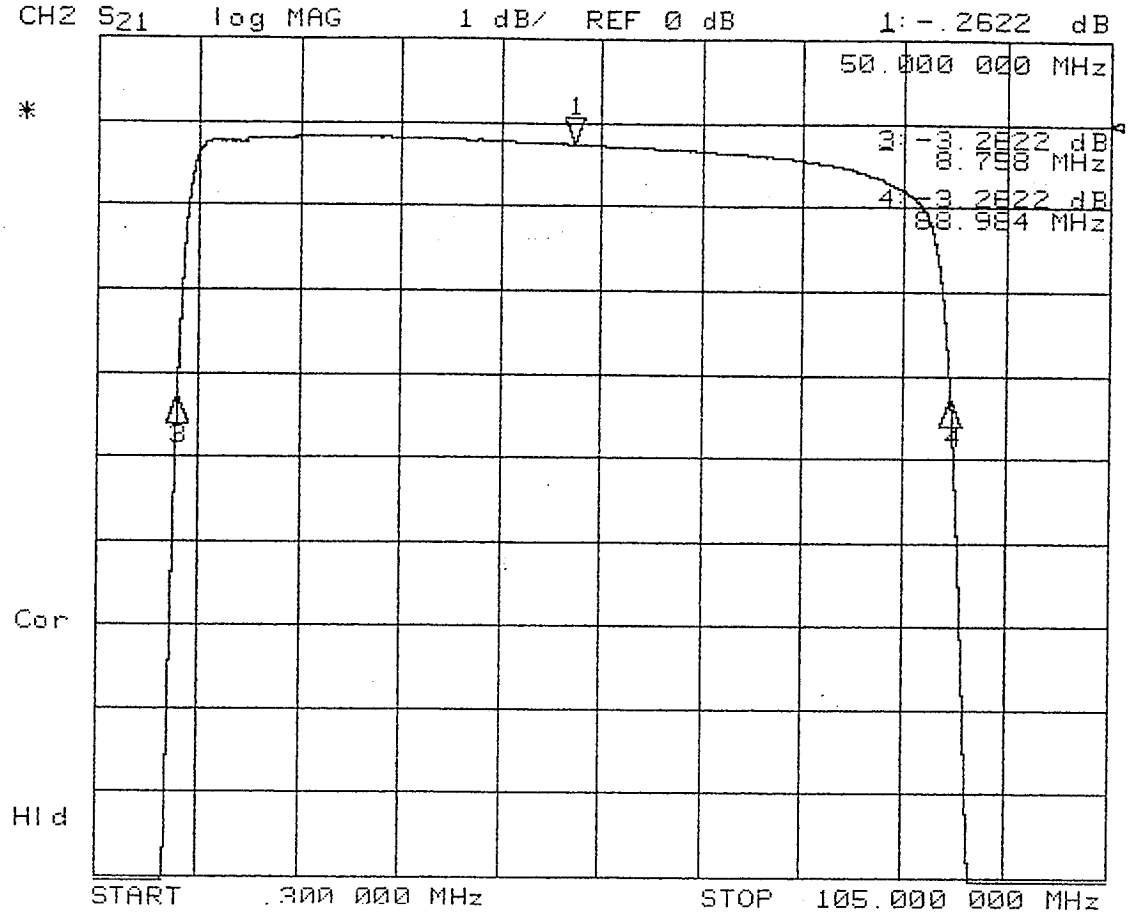
FINAL FUNCTIONAL PERFORMANCE
TRANSMISSION LOSS
SERIAL NO. P229-005
-10C DATA
OPR: R. HOGGATT DATE 11/26/96

MARKER PARAMETERS	Channel 1	Channel 2
MARKER 1	14.000000 MHz OFF	50.000000 MHz -.2360 dB
MARKER 2	86.000000 MHz OFF	49.006507 MHz OFF
MARKER 3	20.000000 MHz OFF	8.783887 MHz -3.2361 dB
MARKER 4	80.000000 MHz OFF	89.229127 MHz -3.2361 dB
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	89.425802 MHz -3.2342 dB
REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-14 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF



FINAL FUNCTIONAL PERFORMANCE
TRANSMISSION LOSS
SERIAL NO. P229-005
+15C DATA
OPR: R. HOGGATT DATE 11/26/96

MARKER PARAME...	...nnel 1	...nnel 2
MARKER 1	14.000000 MHz OFF	50.000000 MHz -.2471 dB
MARKER 2	86.000000 MHz OFF	48.943575 MHz OFF
MARKER 3	20.000000 MHz OFF	8.772071 MHz -3.2472 dB
MARKER 4	80.000000 MHz OFF	89.115079 MHz -3.2472 dB
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	89.425802 MHz -3.2342 dB
REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-14 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF



FINAL FUNCTIONAL PERFORMANCE
TRANSMISSION LOSS
SERIAL NO. P229-005
+40C DATA
OPR: R. HOGGATT DATE 11/26/96

MARKER PARAMETERS	Channel 1	Channel 2
MARKER 1	14.000000 MHz OFF	50.000000 MHz -.2622 dB
MARKER 2	86.000000 MHz OFF	48.871214 MHz OFF
MARKER 3	20.000000 MHz OFF	8.758128 MHz -3.2622 dB
MARKER 4	80.000000 MHz OFF	88.984300 MHz -3.2622 dB
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	89.425802 MHz -3.2342 dB
REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-14 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF

APPENDIX C **ACCEPTANCE TEST REPORT**

BANDPASS FILTER MODEL HL50-80-10SS1 S/N P229-005
AEROJET 1331559-3 REV. E

PASSBAND RIPPLE (CON'T)

{11f} RECORD PASS/FAIL (0.5 dB MAX)	(PASS)/FAIL	(PASS)/FAIL	(PASS)/FAIL
{11g) ATTACH PASSBAND RIPPLE PERFORMANCE X-Y PLOT(S)	✓ (√)	✓ (√)	✓ (√)

OUT-OF-BAND REJECTION

ACCEPTANCE TEST PROCEDURE 63-0005-02 PARA 4.5.5 Fc=50.0 MHz. REF {5A} FOR INSERTION LOSS @ Fc	-10°C	+15°C	+40°C
{12} WORST CASE REJECTION FROM 0.300 MHz TO 1.0 MHz	>100 dB (40.0 dB MIN)	>100 dB (40.0 dB MIN)	>100 dB (40.0 dB MIN)
{13a} WORST CASE REJECTION FROM 102.0 MHz TO 1000.0 MHz	-54.2 dB (40.0 dB MIN)	-55.9 dB (40.0 dB MIN)	-55.9 dB (40.0 dB MIN)
{13c} RECORD MEASURED TEMPERATURE	-13.5 °C (-15.0 TO -10.0)	+14.0°C (12.5 TO 17.5)	+44.0°C (40.0 TO 45.0)
{14} ATTACH REJECTION PERFORMANCE X-Y PLOT(S)	✓ (√) ✓ (√)	✓ (√) ✓ (√)	✓ (√) ✓ (√)

TEST PERFORMED BY R. HOGGAN DATE 11/26/96 (DA 5)

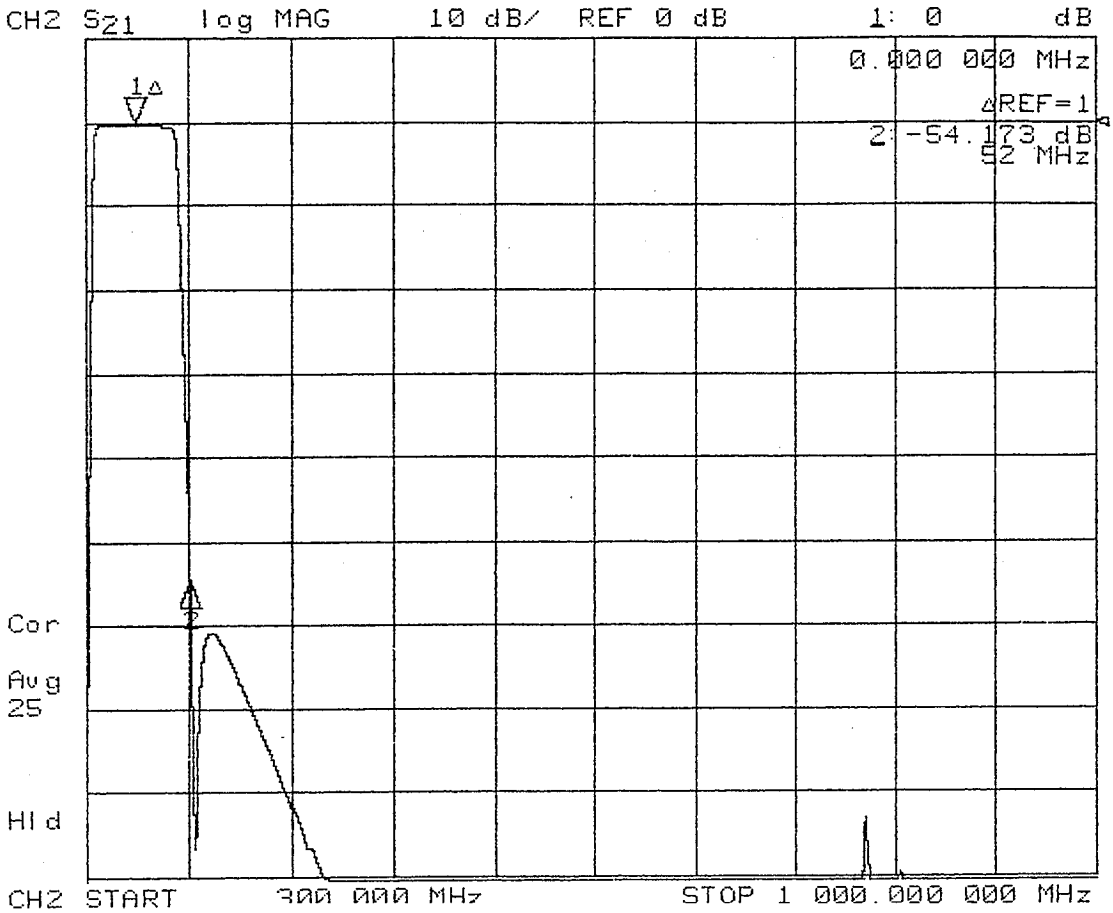
NOTE IF TEST WITNESSED BY AESD: _____ GSI: _____ → NOT WITNESSED THIS TIME (DW)

***** END OF FUNCTIONAL PERFORMANCE TEST ****

OUTLINE AND MOUNTING DIMENSIONS VERIFICATION

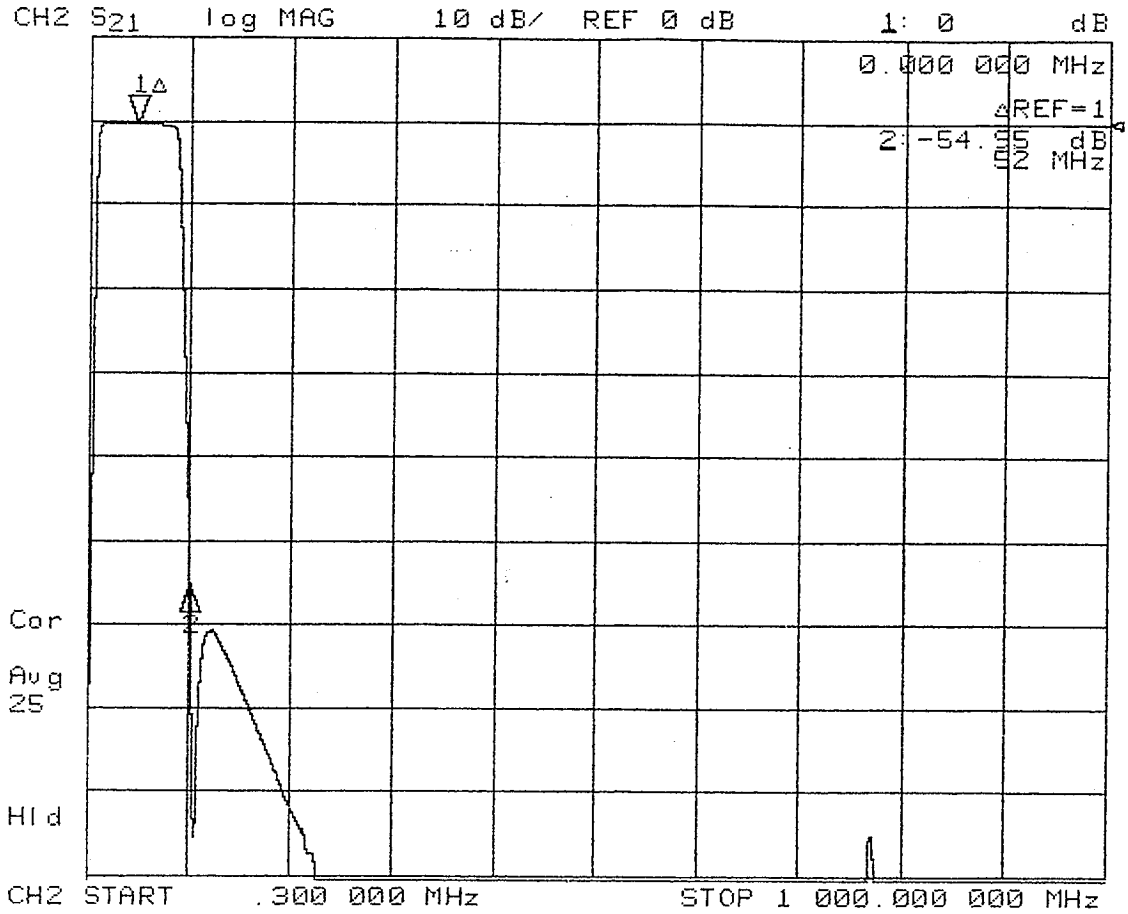
{16} REFERENCE CUSTOMER DRAWING 1331559

DESCRIPTION OF MEASUREMENT	DIMENSION AND TOLERANCE	ACTUAL MEASUREMENT
OVER ALL LENGTH	3.50 ± .03	3.502
MOUNTING HOLE CENTER	0.125 ± .010	.125
BETWEEN UPPER MOUNTING HOLES	3.250	3.250
BETWEEN LOWER MOUNTING HOLES	3.250	3.250



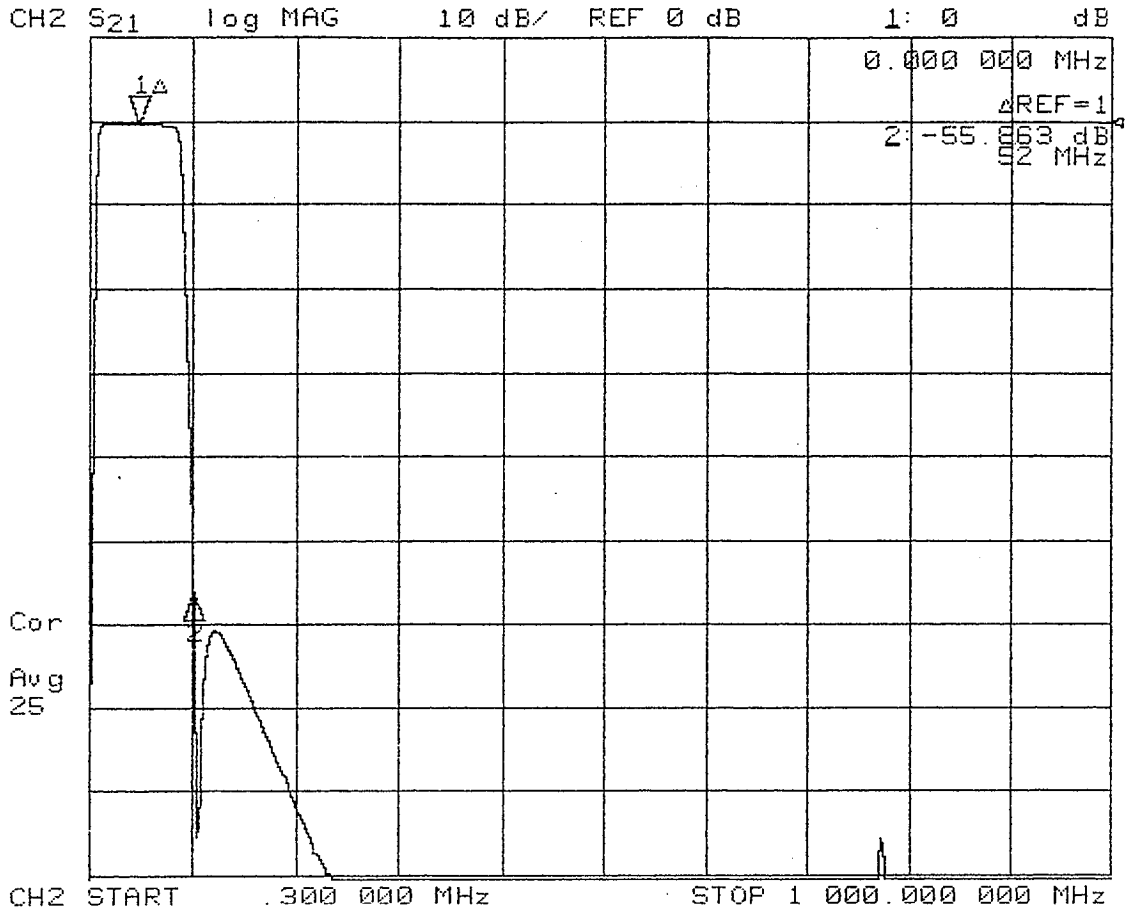
FINAL FUNCTIONAL PERFORMANCE
REJECTION PERFORMANCE
SERIAL NO. P229-005
-10C DATA
OPR: R. HOGGATT DATE 11/26/96

MARKER PARAMETERS	Channel 1	Channel 2
MARKER 1	1.000000 MHz	50.000000 MHz
	OFF	0 dB
MARKER 2	5.000000 MHz	102.000000 MHz
	OFF	-54.173 dB
MARKER 3	5.000000 MHz	102.000000 MHz
	OFF	OFF
MARKER 4	5.000000 MHz	1000.000000 MHz
	OFF	OFF
MKR STIMULUS OFFSET	0.000000 MHz	0.000000 MHz
	0 dB	0 dB
REFERENCE MARKER	OFF	MARKER 1
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-3 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF



FINAL FUNCTIONAL PERFORMANCE
REJECTION PERFORMANCE
SERIAL NO. P229-005
+15C DATA
OPR: R. HOGGATT DATE 11/26/96

MARKER PARAME...	Channel 1	Channel 2
MARKER 1	1.000000 MHz OFF	50.000000 MHz 0 dB
MARKER 2	5.000000 MHz OFF	102.000000 MHz -54.95 dB
MARKER 3	5.000000 MHz OFF	102.000000 MHz OFF
MARKER 4	5.000000 MHz OFF	1000.000000 MHz OFF
MKR STIMULUS OFFSET	0.000000 MHz 0 dB	0.000000 MHz 0 dB
REFERENCE MARKER	OFF	MARKER 1
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-3 dB	-3 dB
MARKER WIDTH VALUE	-3 dB OFF	-3 dB OFF
MARKER TRACKING	OFF	OFF



FINAL FUNCTIONAL PERFORMANCE
REJECTION PERFORMANCE
SERIAL NO. P229-005
+40C DATA
OPR: R. HOGGATT DATE 11/26/96

MARKER PARAMETERS	Channel 1	Channel 2
MARKER 1	1.000000 MHz	50.000000 MHz
	OFF	0 dB
MARKER 2	5.000000 MHz	102.000000 MHz
	OFF	-55.869 dB
MARKER 3	5.000000 MHz	102.000000 MHz
	OFF	OFF
MARKER 4	5.000000 MHz	1000.000000 MHz
	OFF	OFF
MKR STIMULUS OFFSET	0.000000 MHz	0.000000 MHz
	0 dB	0 dB
REFERENCE MARKER	OFF	MARKER 1
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-3 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF

APPENDIX C **ACCEPTANCE TEST REPORT**

BANDPASS FILTER MODEL HL50-80-10SS1 S/N P229-005
AEROJET 1331559-3 REV. E

BANDPASS CHARACTERISTICS MEASUREMENT
PER ATP PARA 4.6
(REF: AE-24687, PARA 4.8.2)

RECORD THE AMBIENT ROOM TEMPERATURE. +23.5 °C (+19°C TO +29.0°C)

{15} ATTACH PASSBAND PERFORMANCE X-Y PLOT ✓ (√)

{24} TEST POINT MATRIX

REF	FREQ	UNIT	VALUE	REF	FREQ	UNIT	VALUE
F1	0.5	MHz	-100.4 dB	F11	(*) 60.0	MHz	-0.32 dB
F2	1.0	MHz	-92.8 dB	F12	(*) 70.0	MHz	-0.39 dB
F3	5.0	MHz	-30.2 dB	F13	80.0	MHz	-0.59 dB
F4	7.5	MHz	-9.48 dB	F14	85.0	MHz	-0.85 dB
F5	10.0	MHz	-1.20 dB	F15	90.0	MHz	-5.77 dB
F6	15.0	MHz	-0.25 dB	F16	100.0	MHz	-44.9 dB
F7	20.0	MHz	-0.19 dB	F17	200.0	MHz	-81.9 dB
F8	(*) 30.0	MHz	-0.18 dB	F18	300.0	MHz	-108.0 dB
F9	(*) 40.0	MHz	-0.21 dB	F19	500.0	MHz	-103.6 dB
F10	50.0	MHz	-0.24 dB	F20	1000.0	MHz	-101.8 dB

TEST PERFORMED BY: R. Hoggatt DATE 11/26/96 (DA)

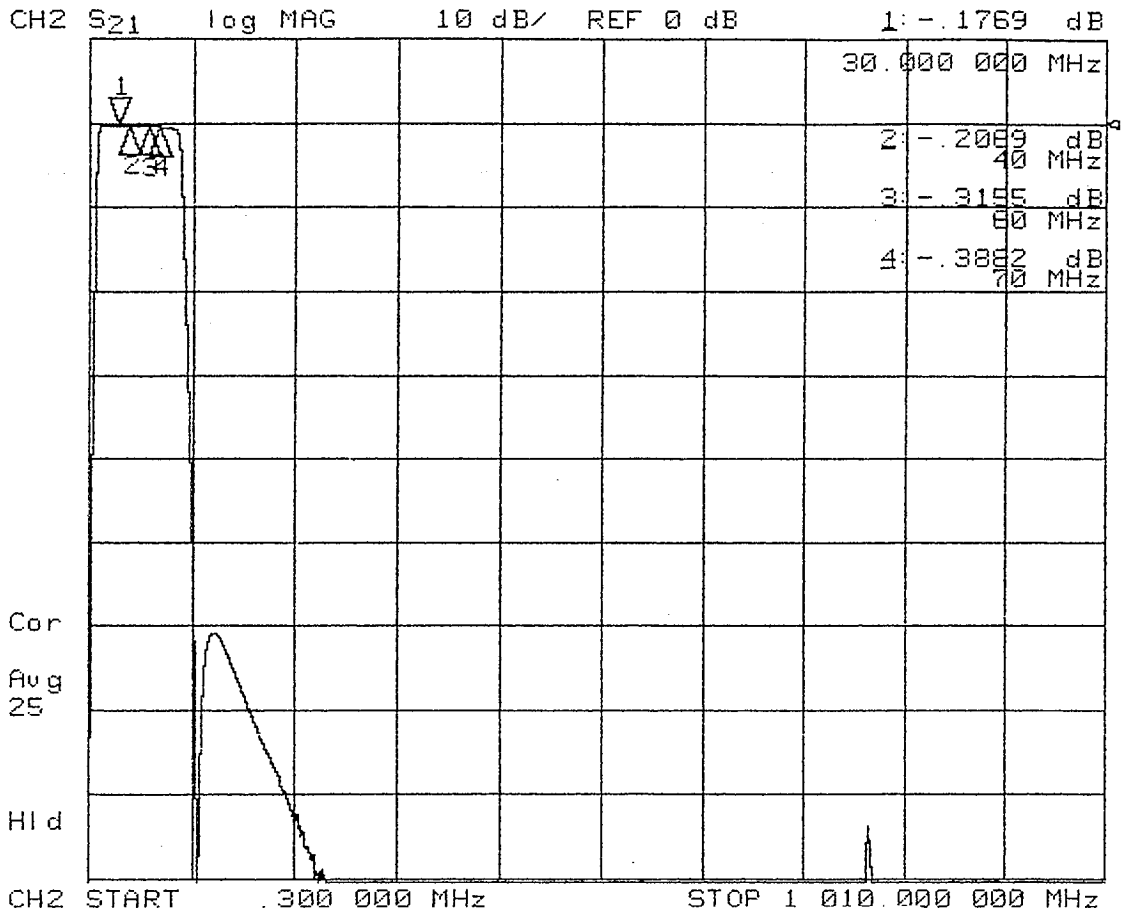
NOTE IF TEST WITNESSED BY AESD _____ GSI _____ > Not witnessed This time DA

***** END OF BANDPASS CHARACTERISTICS TEST *****

FUNCTIONAL PERFORMANCE TEST
ACCEPTANCE TEST PROCEDURE
63-0005-02 PARA 4.1

BRIEF TEST DESCRIPTION: THE TESTS DESCRIBED IN APPENDIX C PAGE 10 THRU PAGE 13 ARE PERFORMED TO DOCUMENT THE FUNCTIONAL PERFORMANCE OF THE UNIT AT THE CONCLUSION OF ALL ENVIRONMENTAL TESTING. THE TESTS ARE AS FOLLOWS AND IN ANY SEQUENCE:

a.) VSWR PER ATP PARA 4.5.1.
b.) INSERTION LOSS PER ATP PARA 4.5.2
c.) INSERTION LOSS VS TEMPERATURE PER ATP PARA 4.5.6.
d.) 3.0 dB BANDWIDTH PER ATP PARA 4.5.3.
e.) CENTER FREQUENCY (fc) PER ATP PARA 4.5.7 (PART OF 3.0 dB B/W TEST)
f.) PASSBAND RIPPLE PER ATP PARA 4.5.4 (PART OF INSERTION LOSS TEST).
g.) OUT-OF-BAND REJECTION PER ATP PARA 4.5.5.



POST THERMAL CYCLE
PASSBAND CHARACTERISTICS
SERIAL NO. P229-005
AMBIENT
OPR: R. HOGGATT DATE 11/26/96

MARKER PARAME...	Channel 1	Channel 2
MARKER 1	1.000000 MHz	30.000000 MHz
	OFF	-.1769 dB
MARKER 2	5.000000 MHz	40.000000 MHz
	OFF	-.2069 dB
MARKER 3	5.000000 MHz	60.000000 MHz
	OFF	-.3155 dB
MARKER 4	5.000000 MHz	70.000000 MHz
	OFF	-.3882 dB
MKR STIMULUS OFFSET	0.000000 MHz	0.000000 MHz
	0 dB	0 dB
REFERENCE MARKER	OFF	OFF
PLACEMENT	CONTINUOUS	CONTINUOUS
MARKER SEARCH	OFF	OFF
TARGET VALUE	-3 dB	-3 dB
MARKER WIDTH VALUE	-3 dB	-3 dB
	OFF	OFF
MARKER TRACKING	OFF	OFF

GAIN STABILITY AND GAIN COMPRESSION

FOR

MIXER/IF AMPLIFIERS

GAIN-TEMPERATURE SENSITIVITY FOR MIXER/AMPLIFIERS

Channel No.	1	2
Specification (+/-dB/°C)	0.02	0.02
Measured (dB/°C)	-0.015	-0.011

Channel 1 Mixer/Amplifier

Mixer/Amplifier (P/N: 1331562-11, S/N: 7A21)

TEST DATA SHEET NO. 6. AMPLIFIER TESTS

GAIN FLATNESS TEST: ATP PARAGRAPH 5.1.3

GAIN FLATNESS (dB)ppK	SPEC. GAIN FLATNESS (dB)ppK	ACC	REJ
0.20	0.50	QA 1	

GAIN VERSUS VOLTAGE SENSITIVITY TEST: ATP PARAGRAPH 5.1.4

AMPLIFIER VOLTAGE	GAIN READING (dBm)	ΔG/ΔV	SPEC. ΔG/ΔV	ACC	REJ
9.96	70.97	2.0	2.0	QA 1	
10.00	71.05				
10.04	71.13				
ΔGv =	0.16 dB				

DATE	ACC	REJ
6-29-98	QA 1	

PART NO. 1331562-116 SPACEK QA

SER NO. 7A21 TEST FAILURE:

TESTED BY: TFF FAILURE ANALYSIS NO.

END DATE: 6-5-98

END TIME: 1600

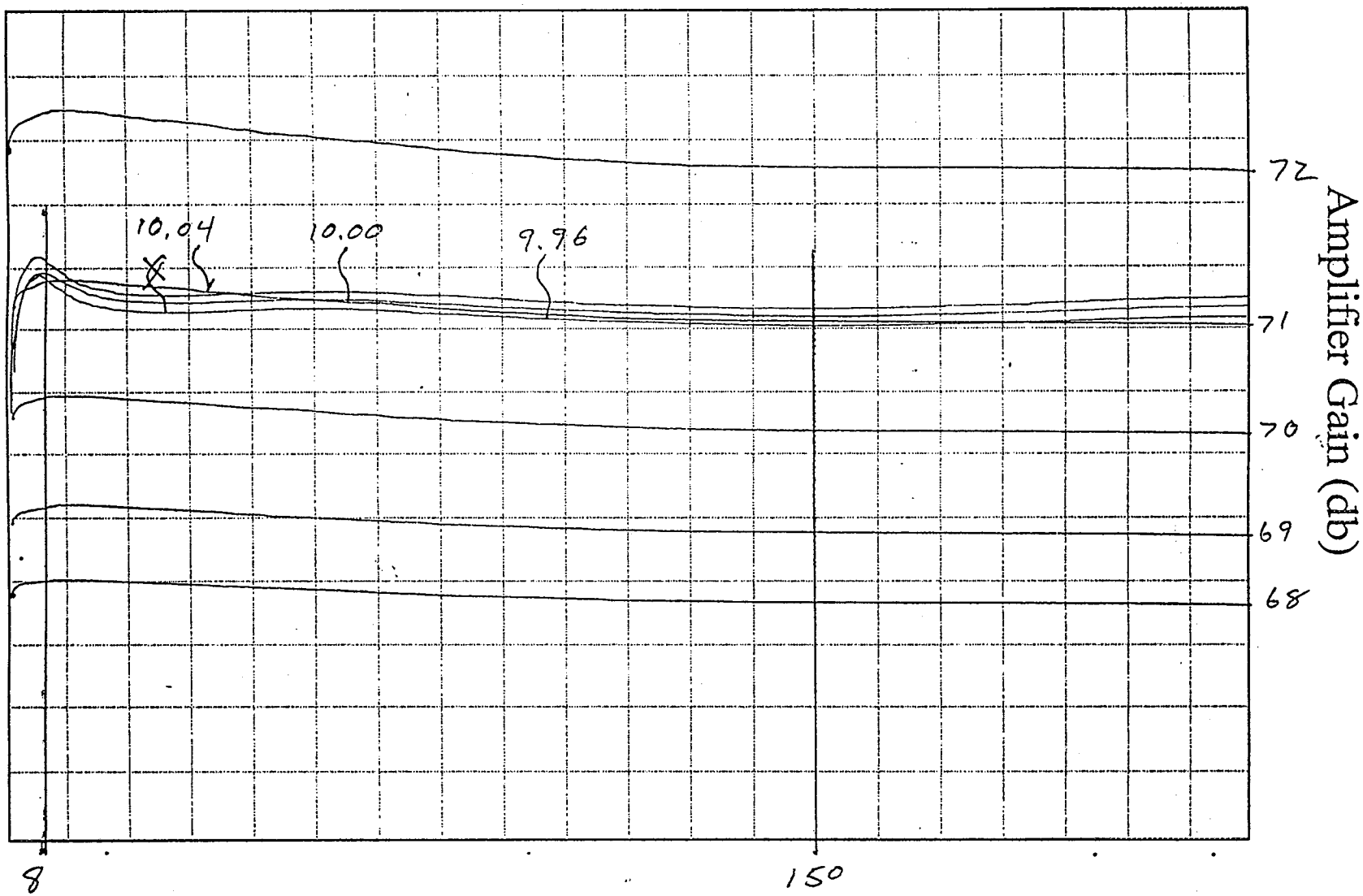
Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara,CA,93101

SPACEK LABS, INC.
MM-WAVE TECHNOLOGY

Amplifier Gain

Model No. 1331562-11
Serial No. 7A21
Date 6-5-98
Tested By TTV

Amb Temp +23°C



TEST DATA SHEET NO. 7. AMPLIFIER TESTS

GAIN VERSUS TEMPERATURE SENSITIVITY TEST: ATP PARAGRAPH 5.1.5

Nominal Temperature (°C)	Relative Gain	ΔG/ΔT	SPEC	ACC	REJ
T1 -6	G_{T1} 71.52				
		* 0.009	0.035dB/°C	QA 1	
T2 +8	G_{T2} 71.39				
		* 0.022	0.020dB/°C		QA 1
T3 +28	G_{T3} 70.95				
		* 0.026	0.035dB/°C	QA 1	
T4 +40	G_{T4} 70.64				

ECN CAMSU-1352

* Perform the following calculations and record on the TDS

$$\Delta G/\Delta T = \frac{G_{Ti} - G_{Ti+1}}{T_i - T_{i+1}} \quad i = 1,2,3,4 \qquad \Delta G_T = 0.88 \text{ dB}$$

$\Delta G_{TOTAL} = \Delta G_V + \Delta G_T + 0.4 = 1.44$ dB Spec 1.4dB ACC____ REJ QA 1

ECN CAMSU-1352

	DATE	ACC	REJ
			QA
SPACEK QA	6-29-98	___	1

PART NO. 1331562-116

SER NO. 7A21

TESTED BY: 777

END DATE: 6-5-98

END TIME: 1600

TEST FAILURE: _____

FAILURE ANALYSIS NO. _____

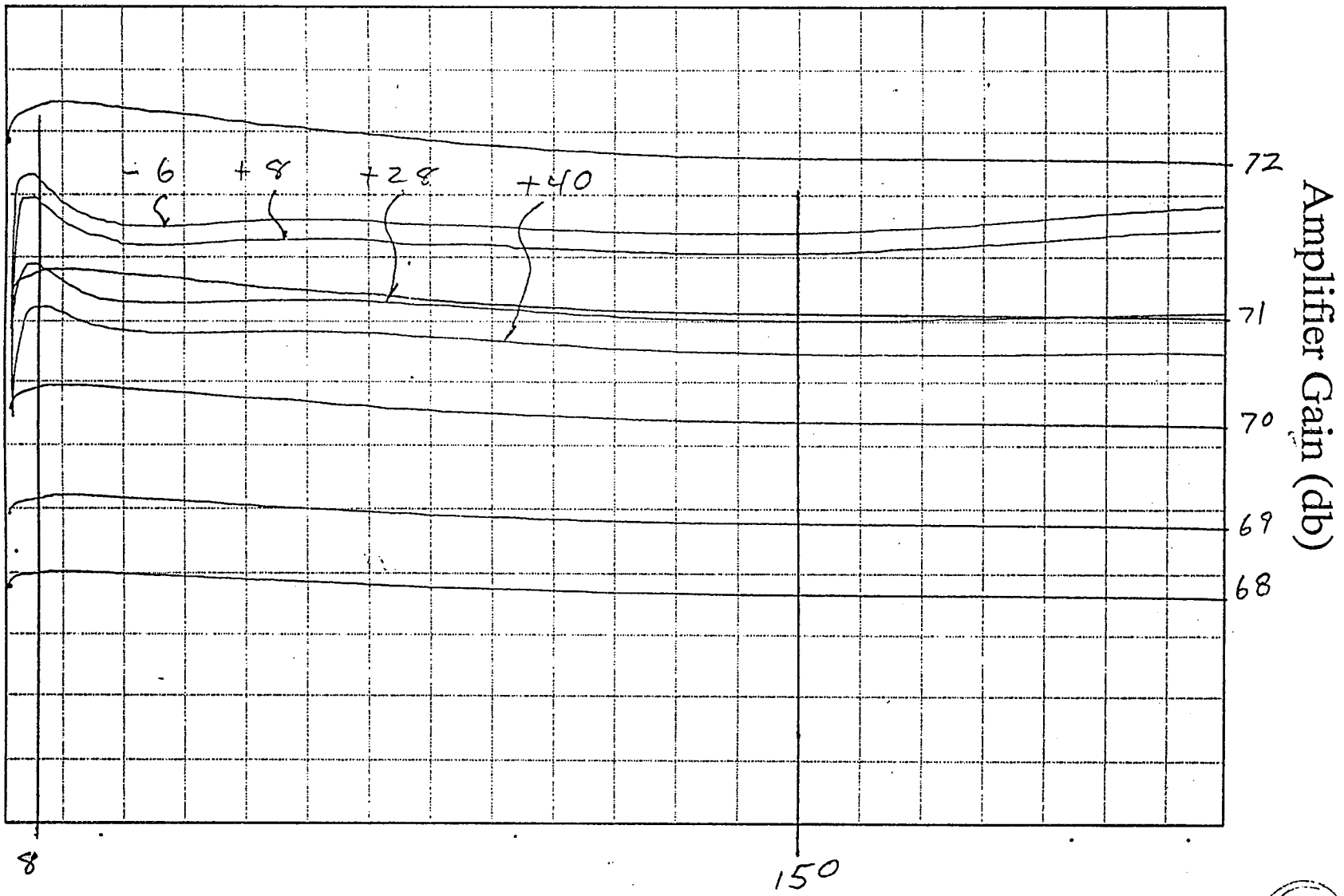
Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara,CA,93101

SPACEK LABS, INC.
MM-WAVE TECHNOLOGY

Amplifier Gain

Model No. 1331562-11G
Serial No. 7A21
Date 6-5-98
Tested By 777

Amb Temp +23°C



TEST DATA SHEET NO. 8. AMPLIFIER TESTS

OUTPUT 1.0 dB COMPRESSION POINT TEST: ATP PARAGRAPH 5.1.6

DASH #

11	12	13	14	15	16	17	18	19	20	FREQ. (MHz)	P2 COMP (dBm)	OUTPUT COMP. at+10(dBm)	SPEC. COMP. PT.(dBm)	ACC	REJ
X	X	X	X		X	X	X	X		10	-2,2	0,8	1.0	QA 1	
				X						20					
	X	X								50					
X	X	X	X	X	X	X	X			100	-2,3	0,7	1.0	QA 1	
X										150	-2,3	0,7	1.0	QA 1	
			X	X	X	X	X	X		200					
								X		400					
									X	500					
									X	1000					
									X	1500					

AMPLIFIER NOISE FIGURE AND TOTAL POWER TEST: ATP PARAGRAPH 5.1.7

DATE: 6-5-98 AMBIENT ROOM TEMPERATURE °C: 23°

AMPLIFIER OUTPUT POWER AMBIENT (dBm)	AMPLIFIER OUTPUT POWER (-77 K)(dBm)	Y FACTOR (dB)	AMPLIFIER NOISE FIGURE (dB)
-22,2	-22,8	3.6	1.19

Above data taken with Daden filter attached (except -19) .

Intermediate test results for information only

		DATE	ACC	REJ
PART NO. 1331562-116	SPACEK QA	6-27-98	[illegible]	

SER NO. 7A21 TEST FAILURE:

TESTED BY: [illegible] FAILURE ANALYSIS NO.

END DATE: 6-5-98

END TIME: 1600

Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara,CA,93101

TEST DATA SHEET NO. 13. MIXER-AMPLIFIER ASSEMBLY TESTS

NOISE FIGURE, TOTAL POWER AND CURRENT VS. TEMPERATURE TEST: ATP PARA 5.4.8.

DATE: 6-24-98 AMBIENT ROOM TEMPERATURE °C: +21

UUT TEMP °C.	UUT CURRENT	MIXER-AMP. OUTPUT POWER (AMBIENT) (dBm)	MIXER-AMP. OUTPUT POWER (77 DEG K) (dBm)	Y FACTOR (dB)	MIXER-AMP. NOISE FIGURE (dB)	SPEC. MIXER-AMP. NOISE FIGURE (dB)	ACC	REJ
-6	43.3	-21.30	-23.20	1.90	3.2	3.5	QA 1	
+8	43.4	-21.50	-23.40	1.90	3.2	3.5	QA 1	
+28	43.5	-21.80	-23.70	1.90	3.2	3.5	QA 1	
+40	43.6	-22.00	-23.85	1.85	3.3	3.5	QA 1	

Noise figure change 0.1 dB Spec is .5dB peak to peak on -20 ACC QA 1 REJ _____

NOTE: *Above data to be taken with the Daden filter, except on the -19 unit.*

NEΔT-NOISE POWER STABILITY TEST: ATP PARAGRAPH 5.4.9

Date: 6-23-98 Ambient Room Temperature °C: 24

Attach computer generated *NEΔT* spreadsheet to this test data sheet.

Record the calculated Nps(K) from spreadsheet data: 0.054

Record Nps(K) 0.07 for dash number from Aerojet specification AE-24869, Table II. Accept units if calculated Nps(K) is less than or equal to specified Nps(K), otherwise reject.

ACC QA 1 REJ _____

DATE ACC REJ

PART NO. 1331562-11B SPACEK QA 6-28-98 QA 1

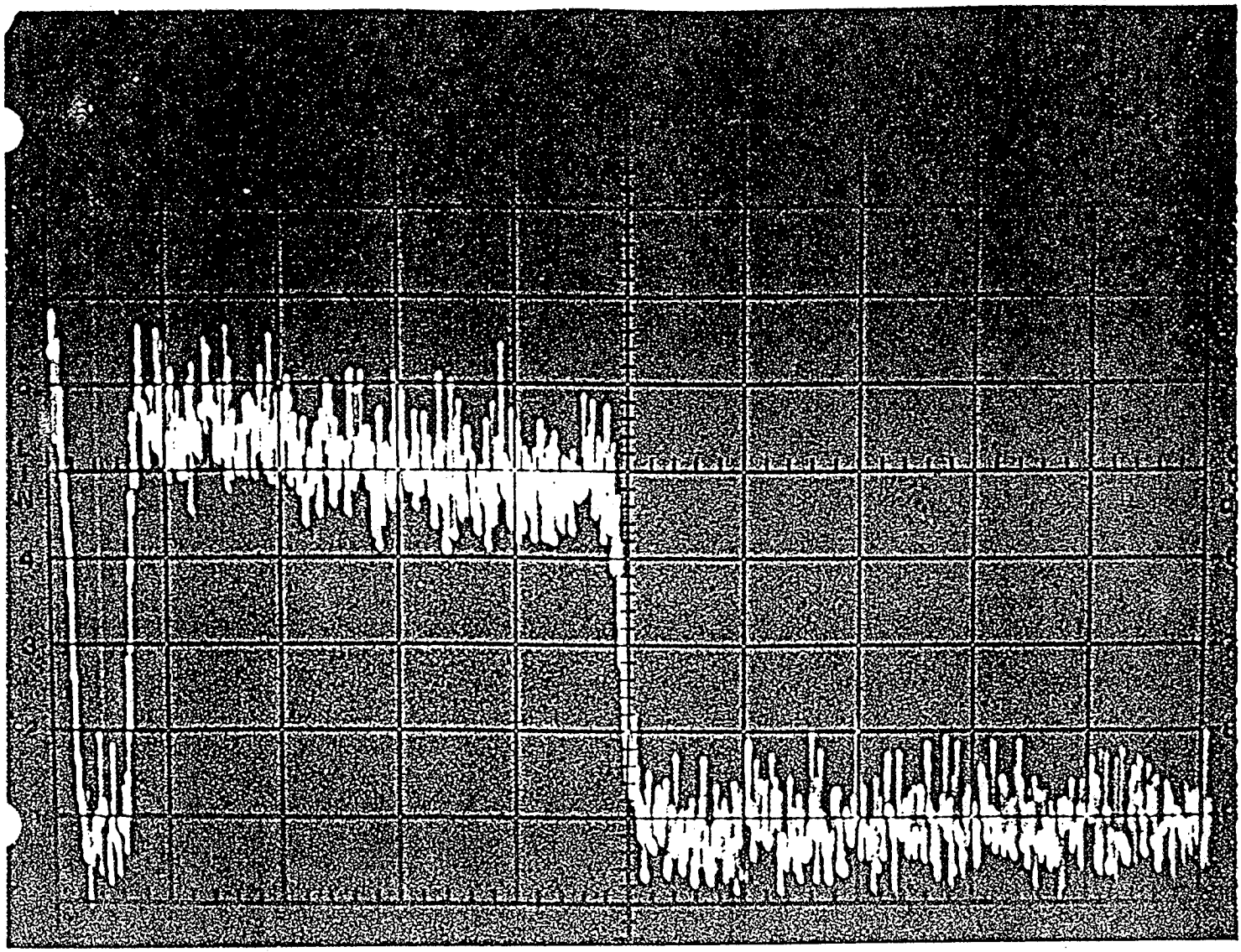
SER NO. 7A21 TEST FAILURE: _____

TESTED BY: _____ FAILURE ANALYSIS NO. _____

END DATE: 6-24-98

END TIME: 1600

Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara,CA,93101



5.4.14 Noise Power Profile

Model No.: 1331562-116

Serial No.: 7A21

Date: 6-29-98

Tested by: QA

Spectrum Analyzer Parameters

Vertical Scale: 2 dB/div.

Scan Width: 30 mhz/Div.

IF Band Width: 10 Khz

Scan Time: 3 sec/Div.

QA 1

Channel 2 Mixer/Amplifier

Mixer/Amplifier (P/N: 1331562-12, S/N: 7A12)

TEST DATA SHEET NO. 6. AMPLIFIER TESTS

GAIN FLATNESS TEST: ATP PARAGRAPH 5.1.3

GAIN FLATNESS (dB)ppK	SPEC. GAIN FLATNESS (dB)ppK	ACC	REJ
		QA	
0.26	0.5	1	

GAIN VERSUS VOLTAGE SENSITIVITY TEST: ATP PARAGRAPH 5.1.4

AMPLIFIER VOLTAGE	GAIN READING (dBm)	ΔG/ΔV	SPEC. ΔG/ΔV	ACC	REJ
10.04	70.67	1.875	2.0	QA 1	
10.00	70.61				
9.96	70.52				
ΔGv =	0.15 dB				

	DATE	ACC	REJ
PART NO. 1331562-126 SPACEK QA	4-21-97	QA 1	

SER NO. 7A12 TEST FAILURE: _____

TESTED BY: [signature] FAILURE ANALYSIS NO. _____

END DATE: 4-21-97

END TIME: 4:00PM

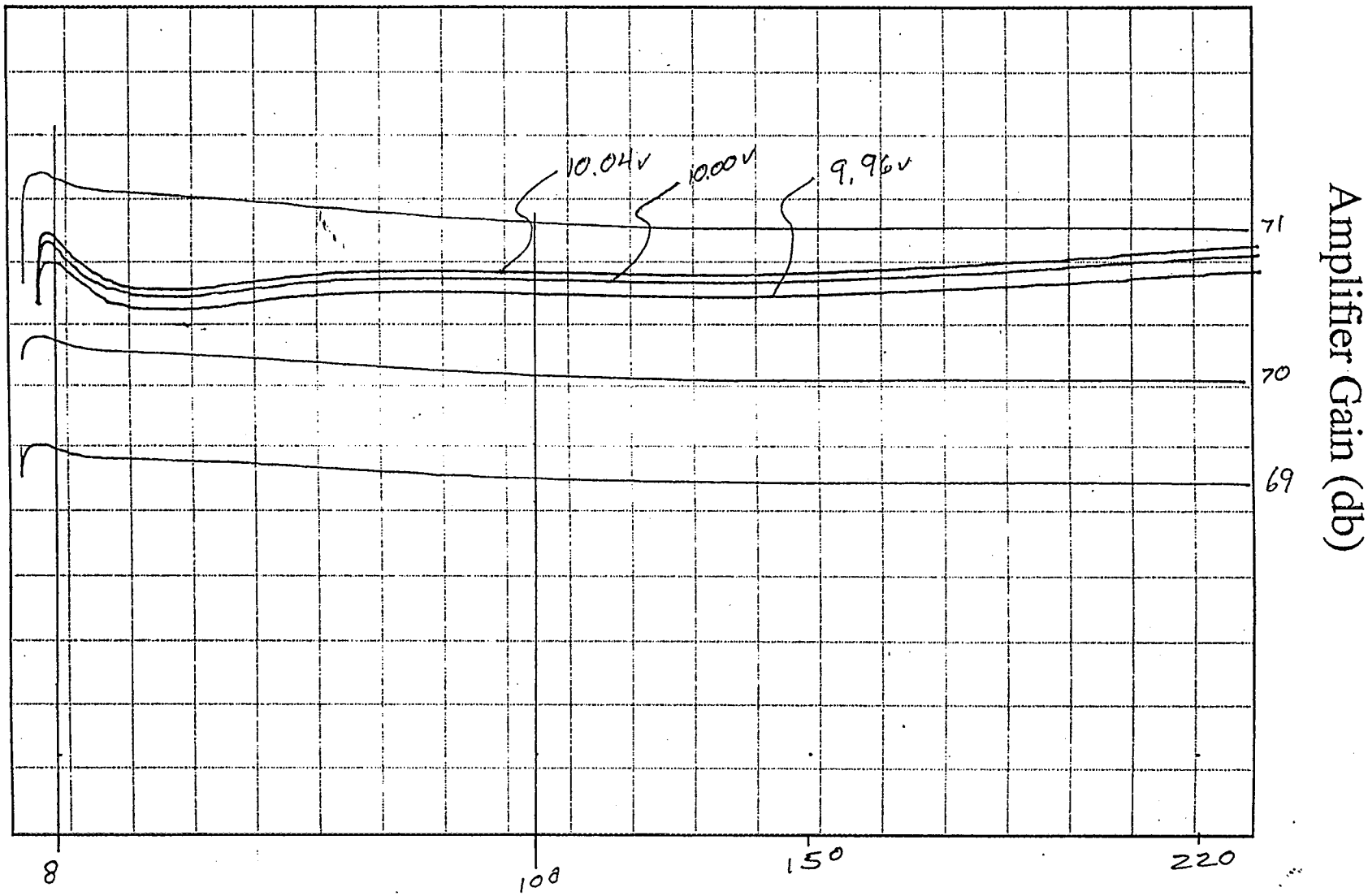
Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara,CA,93101

SPACEK LABS, INC.
MM-WAVE TECHNOLOGY

Model No. 1331562 -12
Serial No. 7A12
Date 4-21-97
Tested By [illegible]

Amplifier Gain

+23°C



TEST DATA SHEET NO. 7. AMPLIFIER TESTS

GAIN VERSUS TEMPERATURE SENSITIVITY TEST: ATP PARAGRAPH 5.1.5

Nominal Temperature (°C)	Relative Gain	ΔG/ΔT	SPEC	ACC	REJ
T1 +40 -0.22	GT1 70.33			QA	
		* 0.018	0.035dB/°C	QA 1	
T2 +28 -0.01	GT2 70.55				
		* 0.0295	0.020dB/°C		QA 1
T3 +8 -0.13	GT3 71.14				
		* 0.011	0.035dB/°C	QA 1	
T4 -6	GT4 71.3				

ECN CAMSV-1352

* Perform the following calculations and record on the TDS

$$\Delta G/\Delta T = \frac{G_{Ti} - G_{Ti+1}}{T_i - T_{i+1}} \quad i = 1,2,3,4$$

$\Delta G_T =$ 0.97 dB

$\Delta G_{TOTAL} = \Delta G_V + \Delta G_T + 0.4 =$ 1.52 dB Spec 1.4dB ACC____ REJ QA 1

ECN CAMSV-1352

	DATE	ACC	REJ
PART NO. 1331562-126	SPACEK QA 4-24-97		QA 1

SER NO. 7A12

TEST FAILURE: _____

TESTED BY: [signature]

FAILURE ANALYSIS NO. _____

END DATE: 4-24-97

END TIME: 4:00PM

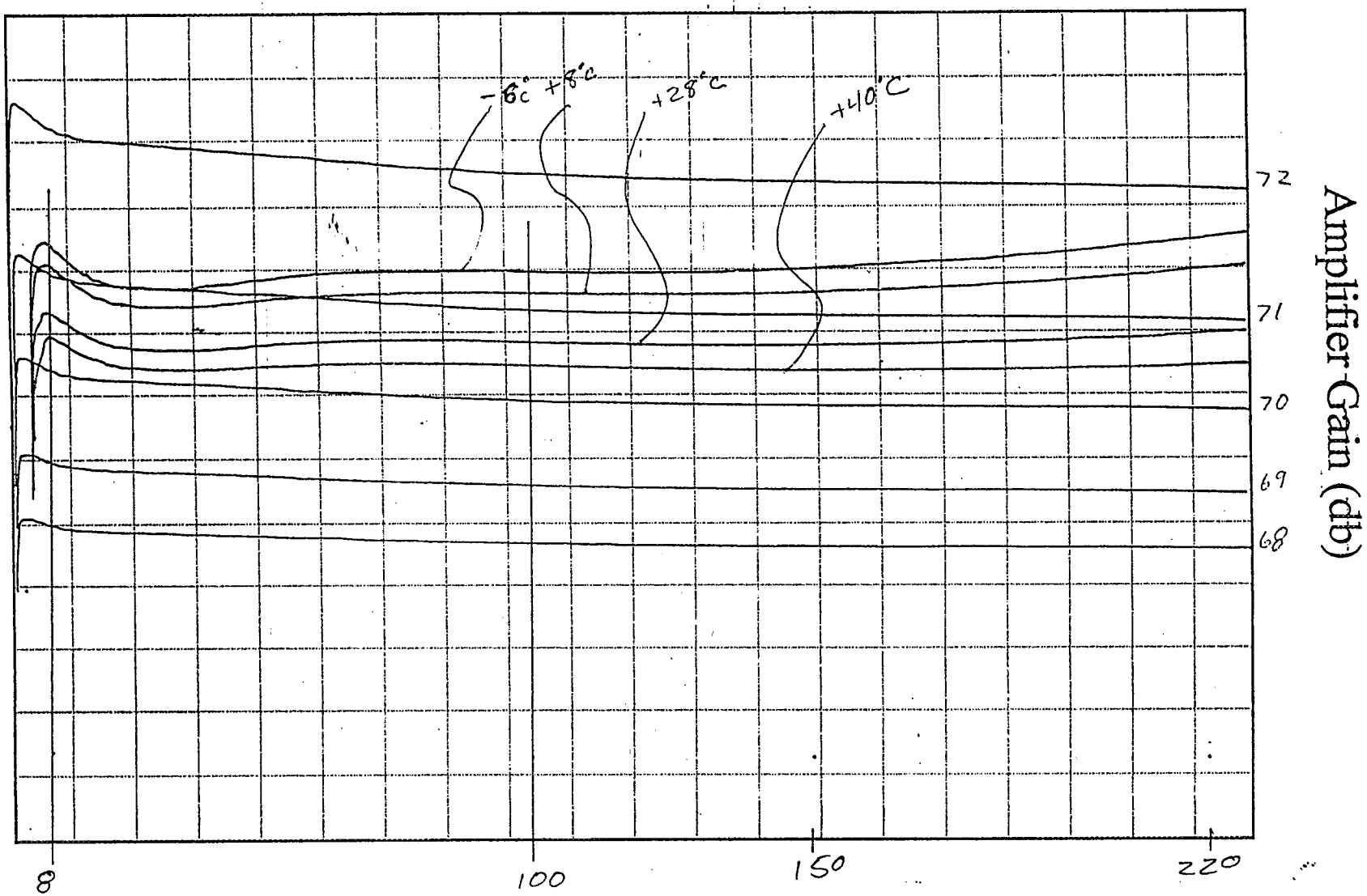
Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara,CA,93101

SPACEK LABS, INC.
MM-WAVE TECHNOLOGY

Amplifier Gain

Model No. 1331562 -12G
Serial No. 7A12
Date 4-24-97
Tested By TTT

Amb Temp +23°C



TEST DATA SHEET NO. 8. AMPLIFIER TESTS

OUTPUT 1.0 dB COMPRESSION POINT TEST: ATP PARAGRAPH 5.1.6

DASH #

11	12	13	14	15	16	17	18	19	20	FREQ. (MHz)	P2 COMP (dBm)	OUTPUT COMP. at+10(dBm)	SPEC. COMP. PT.(dBm)	ACC	REJ
X	X	X	X		X	X	X	X		10	-2.3	0,70	1.0	SA	
				X						20					
	X	X								50	-2,35	0,65	1.0	SA	
X	X	X	X	X	X	X	X			100	-2.35	0,65	1.0	SA	
X										150					
			X	X	X	X	X	X		200					
								X		400					
									X	500					
									X	1000					
									X	1500					

AMPLIFIER NOISE FIGURE AND TOTAL POWER TEST: ATP PARAGRAPH 5.1.7

DATE: 4-20-97 AMBIENT ROOM TEMPERATURE °C: 23

AMPLIFIER OUTPUT POWER AMBIENT (dBm)	AMPLIFIER OUTPUT POWER (-77 K)(dBm)	Y FACTOR (dB)	AMPLIFIER NOISE FIGURE (dB)
-24.0	-27.7	3.7	1.10

Above data taken with Daden filter attached (except -19) .

Intermediate test results for information only

		DATE	ACC	REJ
PART NO. 1331562-126	SPACEK QA	4-20-97	SA	

SER NO. 7A12 TEST FAILURE: _____

TESTED BY: [signature] FAILURE ANALYSIS NO. _____

END DATE: 4-20-97

END TIME: 4:00 pm

Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara,CA,93101

TEST DATA SHEET NO. 13. MIXER-AMPLIFIER ASSEMBLY TESTS

NOISE FIGURE, TOTAL POWER AND CURRENT VS. TEMPERATURE TEST: ATP PARA 5.4.8.

DATE: 1-5-98 AMBIENT ROOM TEMPERATURE °C: +22

UUT TEMP °C.	UUT CURRENT (mA)	MIXER-AMP. OUTPUT POWER (AMBIENT) (dBm)	MIXER-AMP. OUTPUT POWER (77 DEG K) (dBm)	Y FACTOR (dB)	MIXER-AMP. NOISE FIGURE (dB)	SPEC. MIXER-AMP. NOISE FIGURE (dB)	ACC	REJ
-6	42.8	-23.00	-25.15	2.15	2.8	3.2	QA 1	
+8	42.9	-23.20 (-0.2)	-25.35	2.15	2.8	3.2	QA 1	
+28	43.0	-23.40 (-0.2)	-25.50	2.10	2.9	3.2	QA 1	
+40	43.1	-23.50 (-0.1)	-25.60	2.10	2.9	3.2	QA 1	

Noise figure change .1 dB Spec is .3dB peak to peak on -11 thru -19 Spec is .5dB peak to peak on -20 OK ACC QA 1 REJ

NOTE: *Above data to be taken with the Daden filter, except on the -19 unit.*

NEΔT-NOISE POWER STABILITY TEST: ATP PARAGRAPH 5.4.9

Date: 1-19-98 Ambient Room Temperature °C: 23

Attach computer generated *NEΔT* spreadsheet to this test data sheet.

Record the calculated Nps(K) from spreadsheet data: 0.055

Record Nps(K) 0.07 for dash number from Aerojet specification AE-24869, Table II. Accept units if calculated Nps(K) is less than or equal to specified Nps(K), otherwise reject.

ACC QA 1 REJ

DATE ACC REJ

PART NO. 1331562-12 SPACEK QA 1-21-98 QA 1

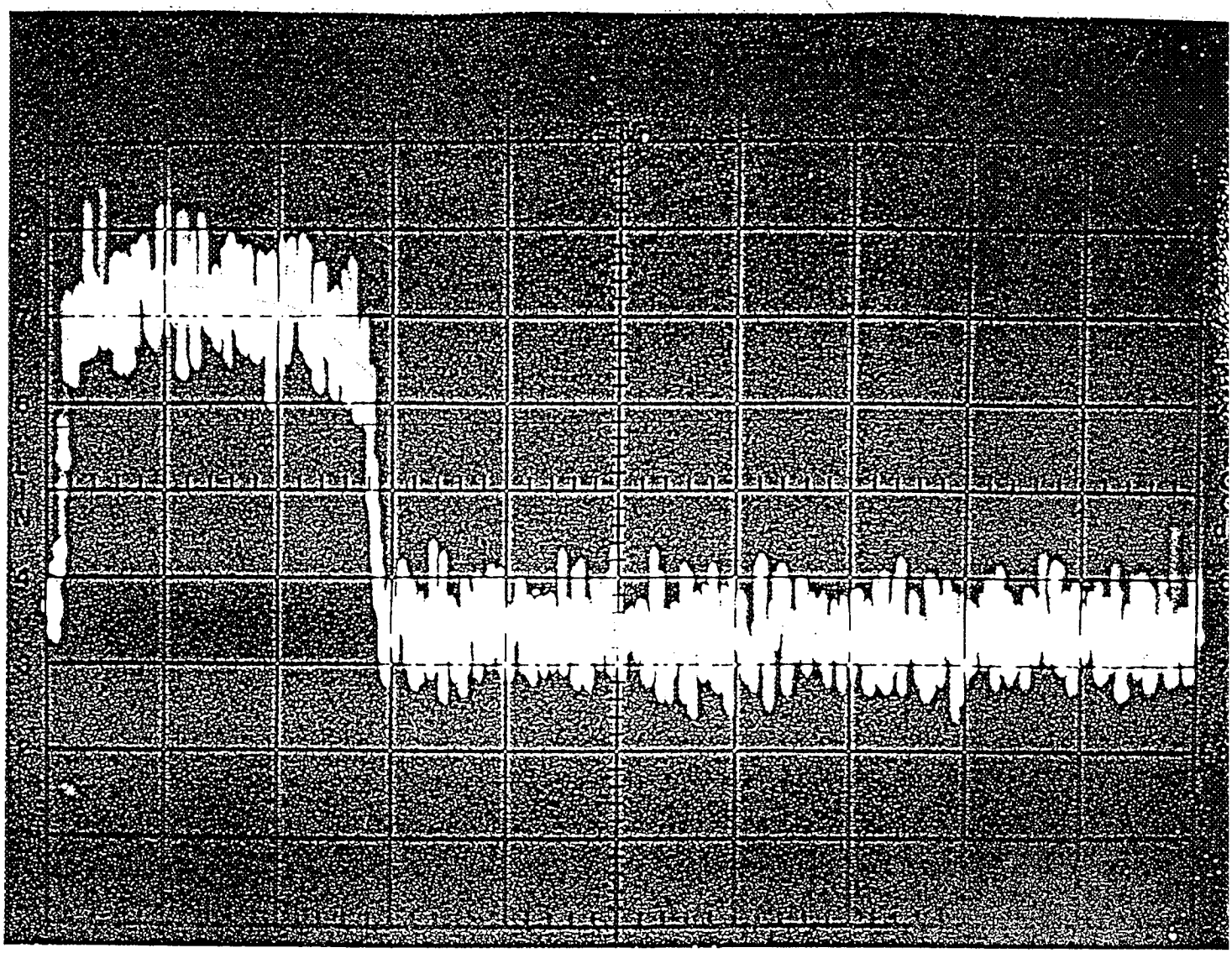
SER NO. 7A12 TEST FAILURE:

TESTED BY: DJ FAILURE ANALYSIS NO.

END DATE: 1-19-98

END TIME: 4:00 pm

Spacek Labs, Inc.
212 E. Gutierrez St.
Santa Barbara,CA,93101



5.4.14 Noise Power Profile

Model No.: 1331562-12E

Serial No.: 7A12

Date: 1-21-98

Tested by: DL

Spectrum Analyzer Parameters

Vertical Scale: 2 dB/div.

Scan Width: 30 mhz/Div..

IF Band Width: 10 Khz

Scan Time: 3 sec/Div.

No video filter.

QA 1

SUBSYSTEM-LEVEL TEST DATA

TEST DATA

FOR

AMSU-A2 (P/N: 1356441-1, S/N: F02)

CENTER FREQUENCY OF LOs

Channel No.	1	2
Specification (GHz) *	23.8	31.4
Setting Accuracy (+/-GHz)	0.008	0.008
Measured (GHz) **	23.800	31.399

* Specification in vacuum condition.

** Measured at ambient pressure (standard atmosphere).

TEST DATA SHEET 3

LO Frequency Test Data (Paragraph 3.5.1) (A2)

Test Setup Verified: T. Tjuoy (Signature) Baseplate Temperature (T_B) 23.7 °C

Component	Channel No.	V_b(V)	I_b(mA)	P_{dc}(mW) Required (Max)	P_{dc}(mW) Measured	P_{dc}(mW) Pass/Fail	f_o(GHz) Required	f_o(GHz) Measured	f_o(GHz) Pass/Fail
LO	1	10.01	69.6	2,000	696.7	P	23.800 ± 0.008	23.800	P
	2	10.01	128.4	2,100	1285.3	P	31.400 ± 0.008	31.399	P
Mixer/ Amps	All	10.00	84.0	900	840.0				
TOTAL				5,000	2822.0				

Pass = P, Fail = F

Part No.: 1356441-1

Serial No.: F02

Test Engineer: T. Tjuoy

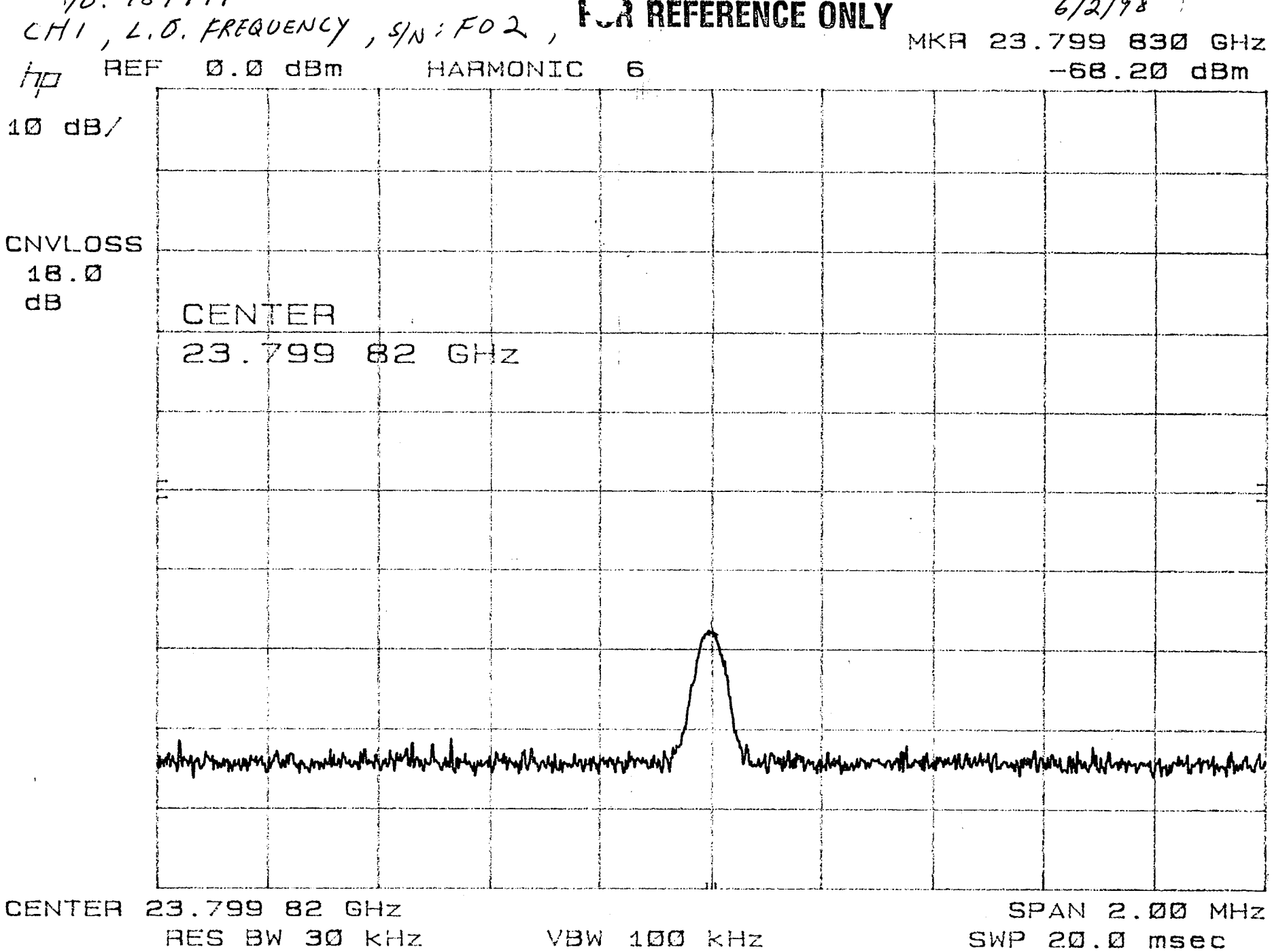
Quality Assurance: QC 229 7/20/98

Date: 6/2/98

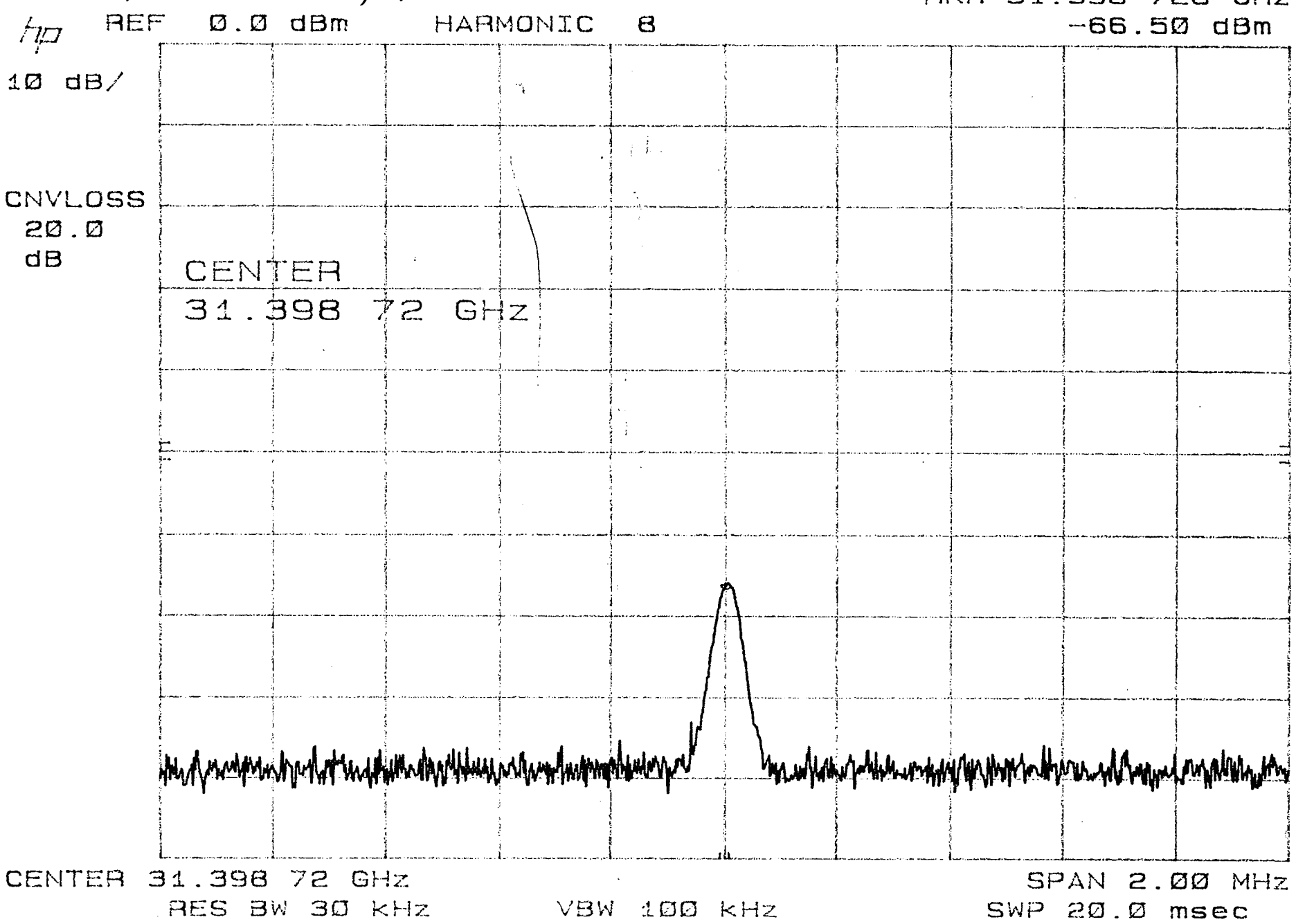
j/o: 484971
CH1, L.O. FREQUENCY, S/N: F02,

FOR REFERENCE ONLY

6/2/98



S/O: 484971
CH2, L.O. FREQUENCY, S/N: F02, **FOR REFERENCE ONLY** 6/2/98



TEST DATA SHEET 6

IF Output Test Data (Paragraph 3.5.2) (A2)

Test Setup Verified: Y. Trinh (Signature) Baseplate Temperature (T_B) 24.7 °C

Component	Channel No.	V_b(V)	I_b(mA)	P_o(dBm)	Atten (dB)	P_o(dBm)		
						Required	Measured	Pass/ Fail
LO	1	10.02	69.8	-21.87	5	-27.0 ± 1.0	-26.86	P
	2	10.02	128.3	-23.23	4	-27.0 ± 1.0	-27.31	P
Mixer/ Amps	All	10.01	84.0					

Pass = P, Fail = F

Part No.: 484971

Serial No.: F02

Test Engineer: Y. Trinh

Quality Assurance: QC 229 7/20/98

Date: 06/3/98

TEST DATA SHEET 9

Bandpass Characteristics Test Data (Paragraph 3.5.3) (A2)

Test Setup Verified: Y. Yrish (Signature) Baseplate Temperature (T_B) 22.5 °C

Component	Channel No.	V_b(V)	I_b(mA)	3 dB BW Frequency (MHz) Lower	3 dB BW Frequency (MHz) Higher	3 dB BW Frequency (MHz) Required MAX.	3 dB BW Frequency (MHz) Measured	Pass/ Fail
LO	1	10.02	69.75	8.8	135.5	~~270~~ 135	126.8	P
	2	10.02	128.4	N/A		~~180~~ 90		N/A
Mixer/ Amps	All	10.00	83.62					

Component	Channel No.	V_b(V)	I_b(mA)	40 dB BW Frequency (MHz) Lower	40 dB BW Frequency (MHz) Higher	40 dB BW Frequency (MHz) (REF. ONLY) Required MAX.	40 dB BW Frequency (MHz) (REF. ONLY) Measured	Pass/ Fail
LO	1	N/A				351		N/A
	2	N/A				234		~~N/A~~
Mixer/ Amps	All							

~~180~~ 90

Part No.: 1356441-1

Serial No.: F02

Test Engineer: Y. Yrish

Quality Assurance: [signature] (7A 190) 7/6/98

Date: 07/8/98

SHEET 50 OF ____
DCF NO. 1764

TEST DATA SHEET 9

Bandpass Characteristics Test Data (Paragraph 3.5.3) (A2)

Test Setup Verified: Y. Trinh (Signature) Baseplate Temperature (T_B) 24.6 °C

Component	Channel No.	V_b(V)	I_b(mA)	3 dB BW Frequency (MHz)		3 dB BW Frequency (MHz)		Pass/ Fail
				Lower	Higher	Required MAX.	Measured	
LO	1	10.02	69.8	8.4	133.9	~~270~~ 135	125.5	P
	2	10.02	128.3	8.4	88.8	~~180~~ 90	80.4	P
Mixer/ Amps	All	10.01	84.0					

Component	Channel No.	V_b(V)	I_b(mA)	40 dB BW Frequency (MHz)		40 dB BW Frequency (MHz) (REF. ONLY)		Pass/ Fail
				Lower	Higher	Required MAX.	Measured	
LO	1	10.02	69.8	3.4	147.0	351	143.6	P
	2	10.02	128.3	3.6	99.8	234	96.2	P
Mixer/ Amps	All	10.01	84.0					

Part No.: 1356441-1

Serial No.: F02

Test Engineer: Y. Trinh

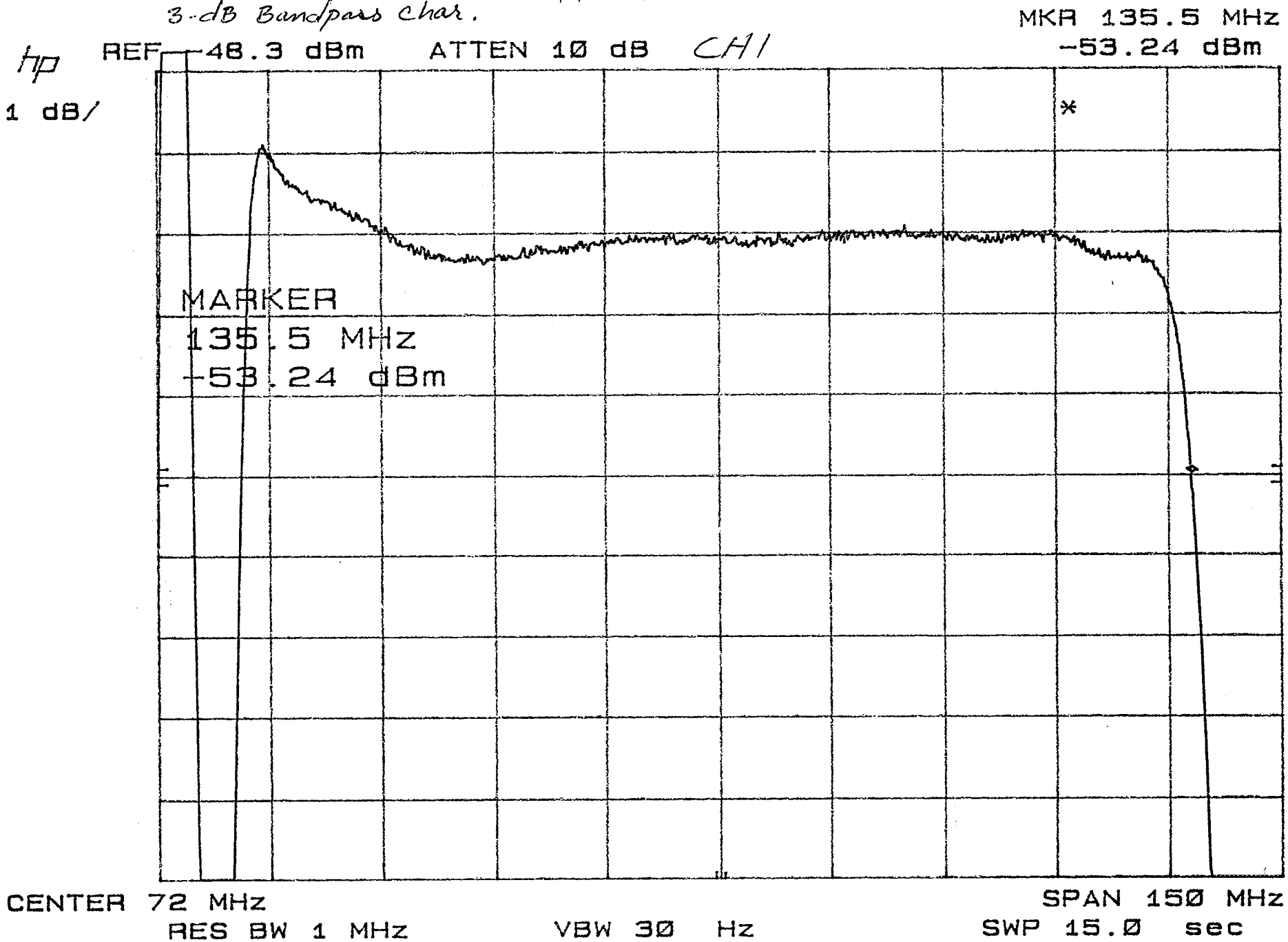
Quality Assurance: QC 229 7/20/98

Date: 06/3/98

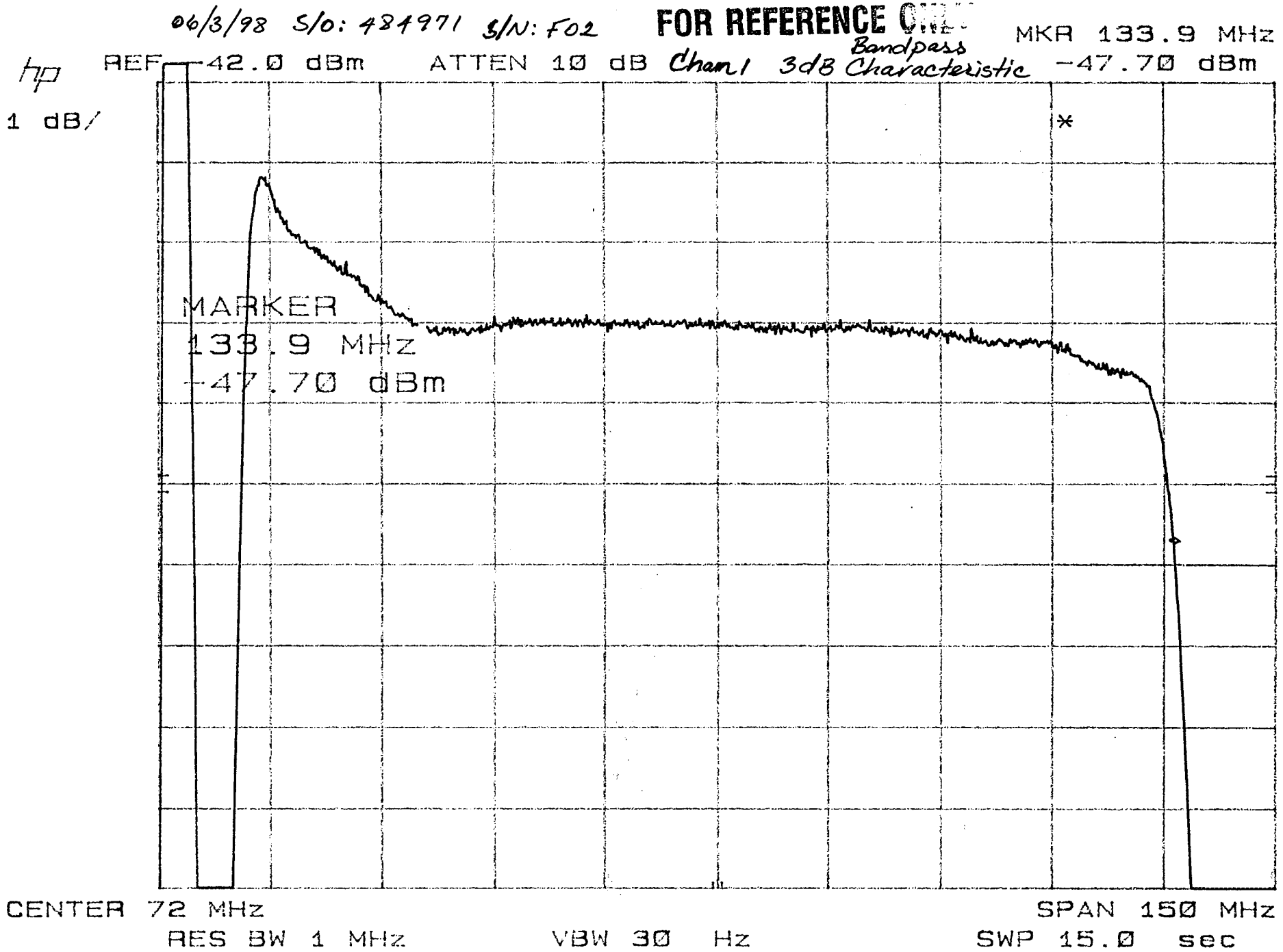
SO. 434971 oper NO. 8260 6/12/93 (TA 190)

3-dB Bandpass char.

FOR REFERENCE ONLY

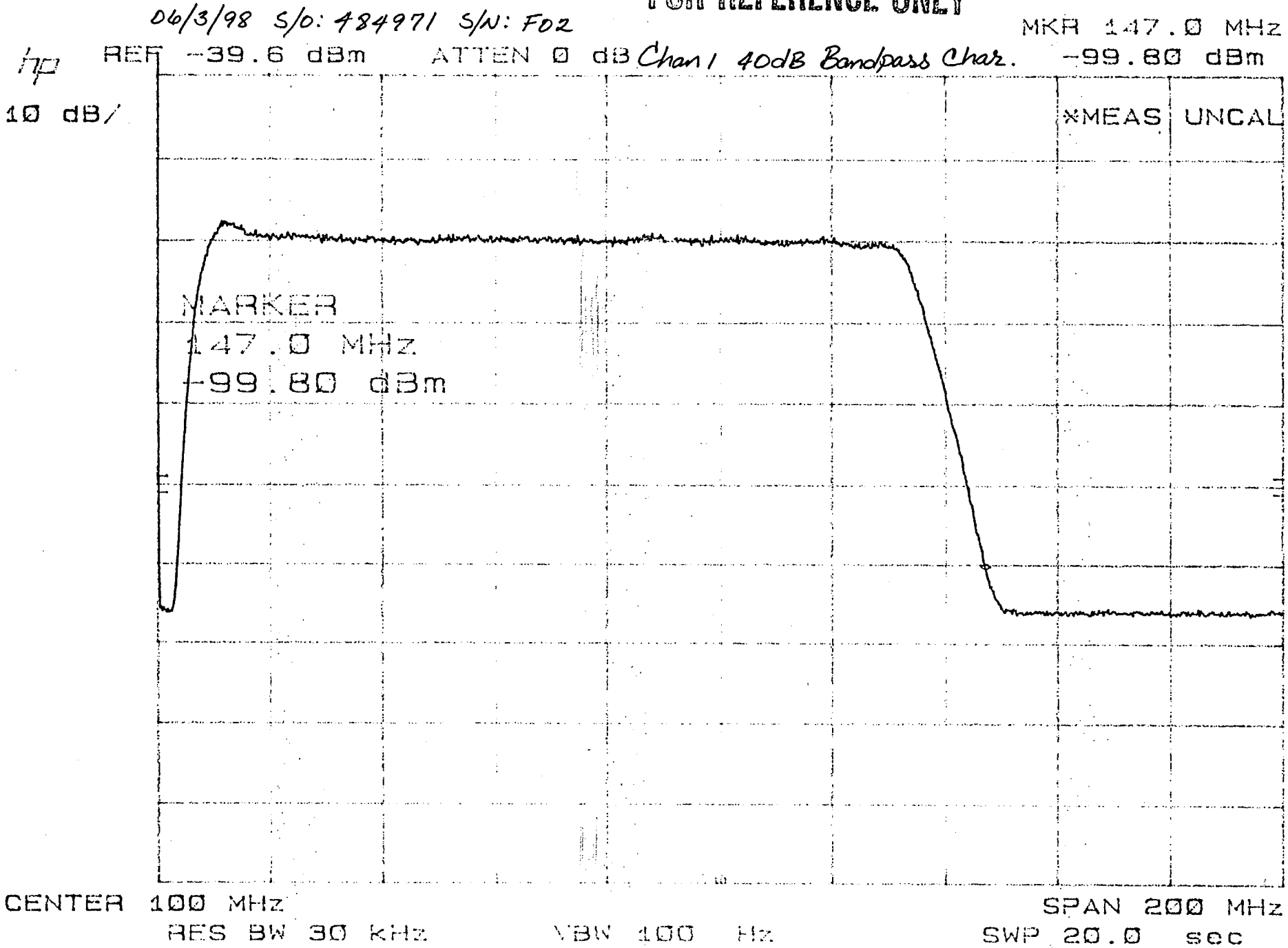


06/3/98 S/O: 484971 S/N: F02 **FOR REFERENCE ONLY**

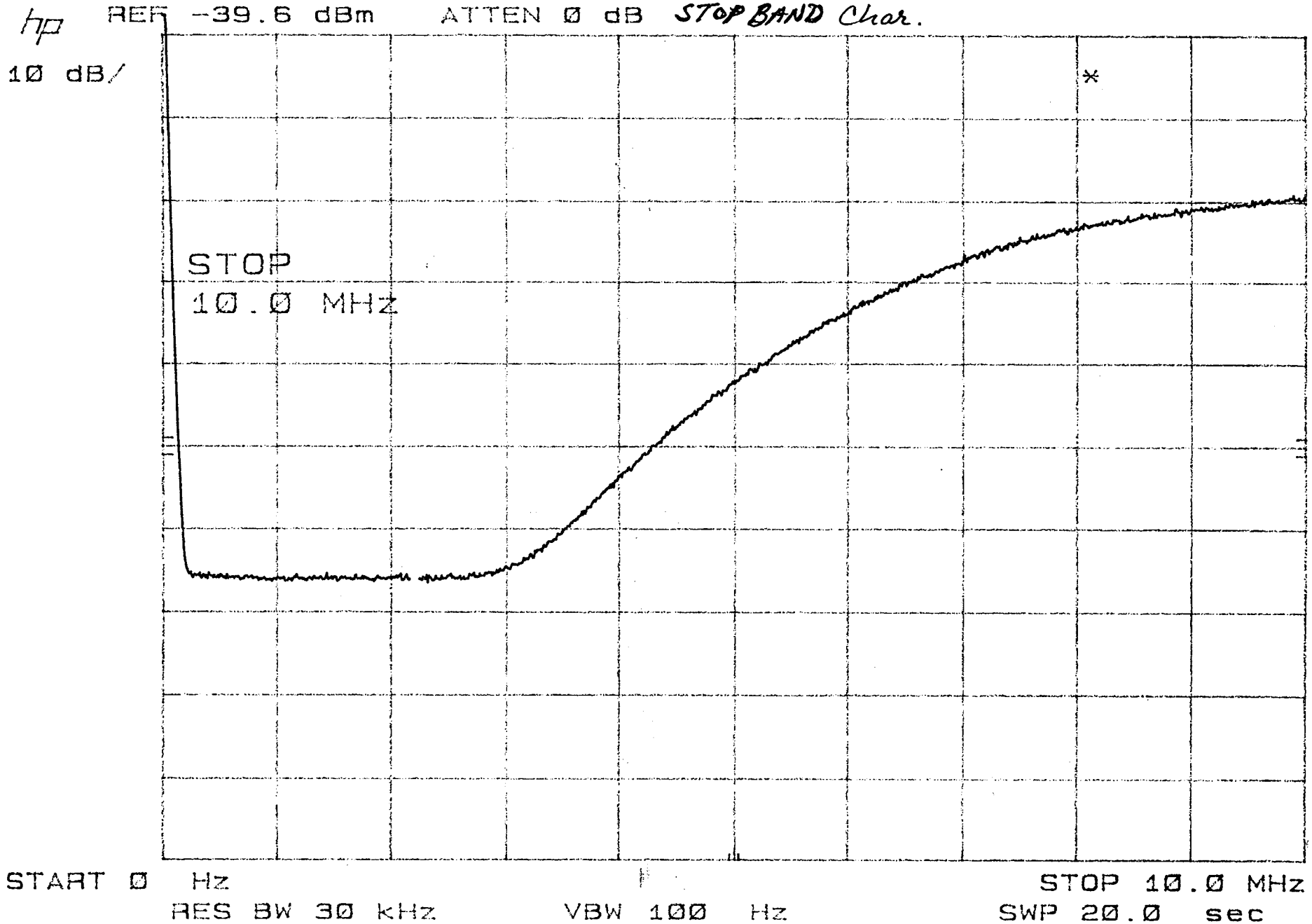


FOR REFERENCE ONLY

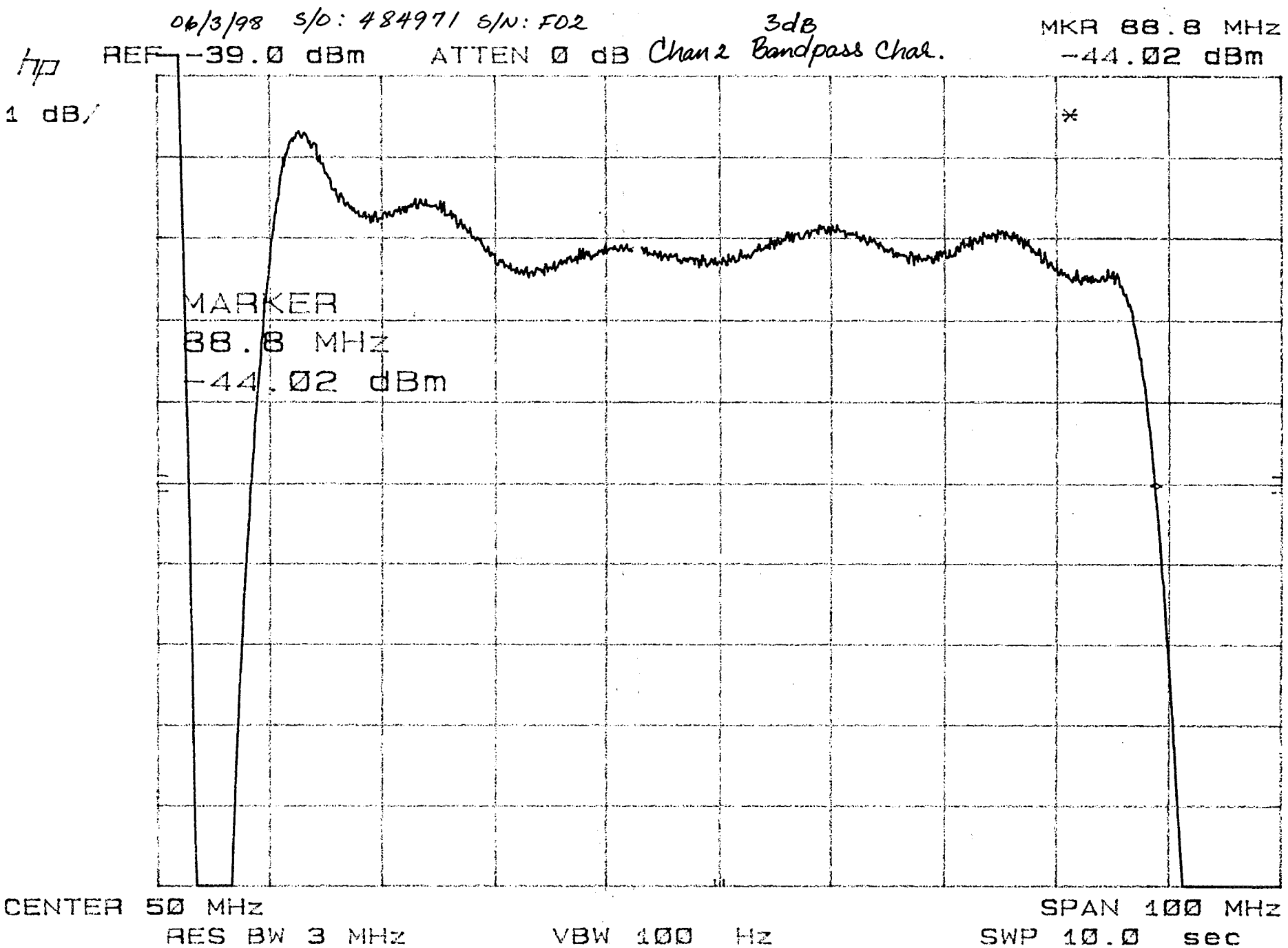
06/3/98 S/O: 484971 S/N: F02



06/3/98 S/O: 484971 S/N: F02 Chan1 **FOR REFERENCE ONLY**

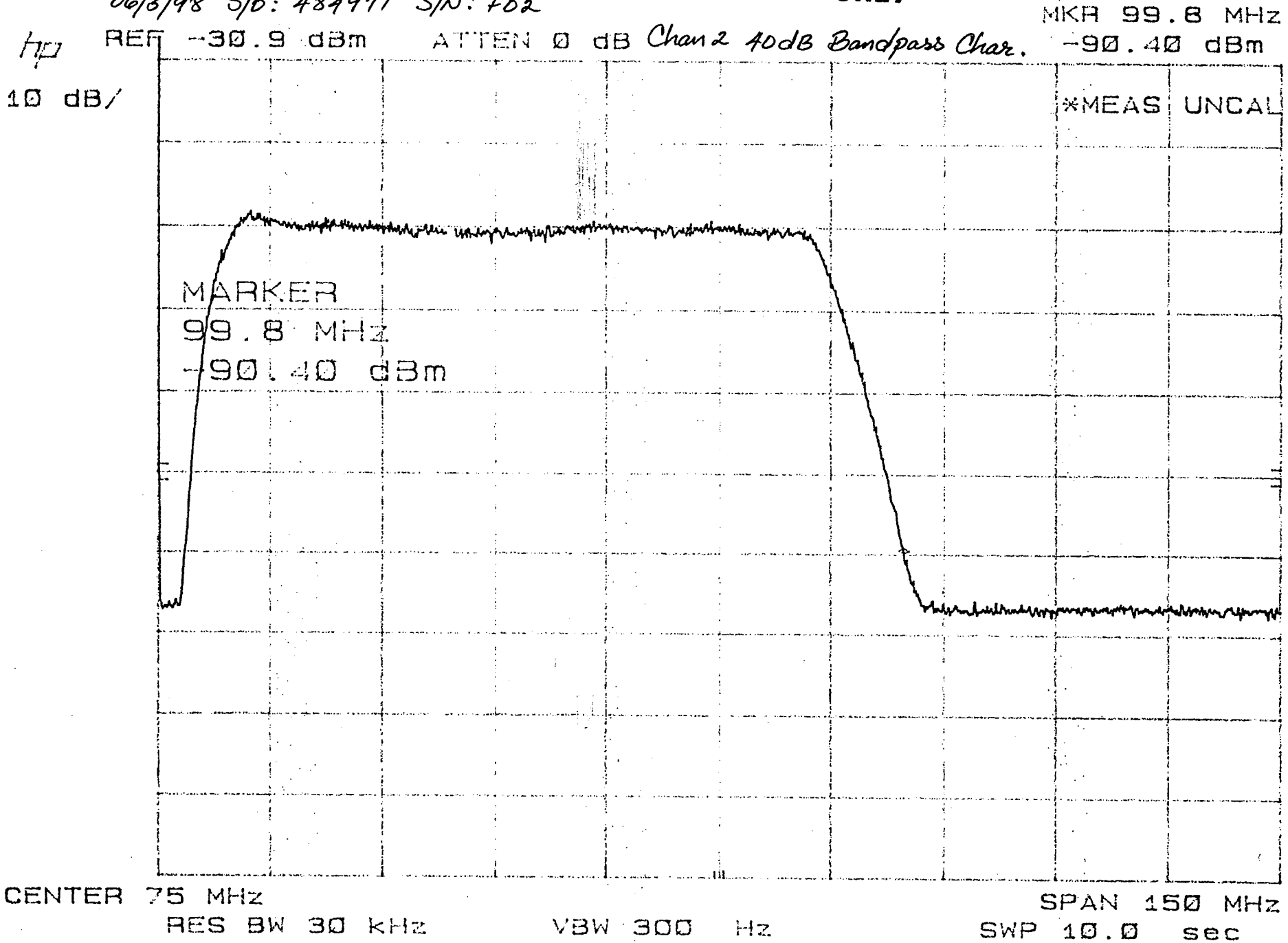


FOR REFERENCE ONLY



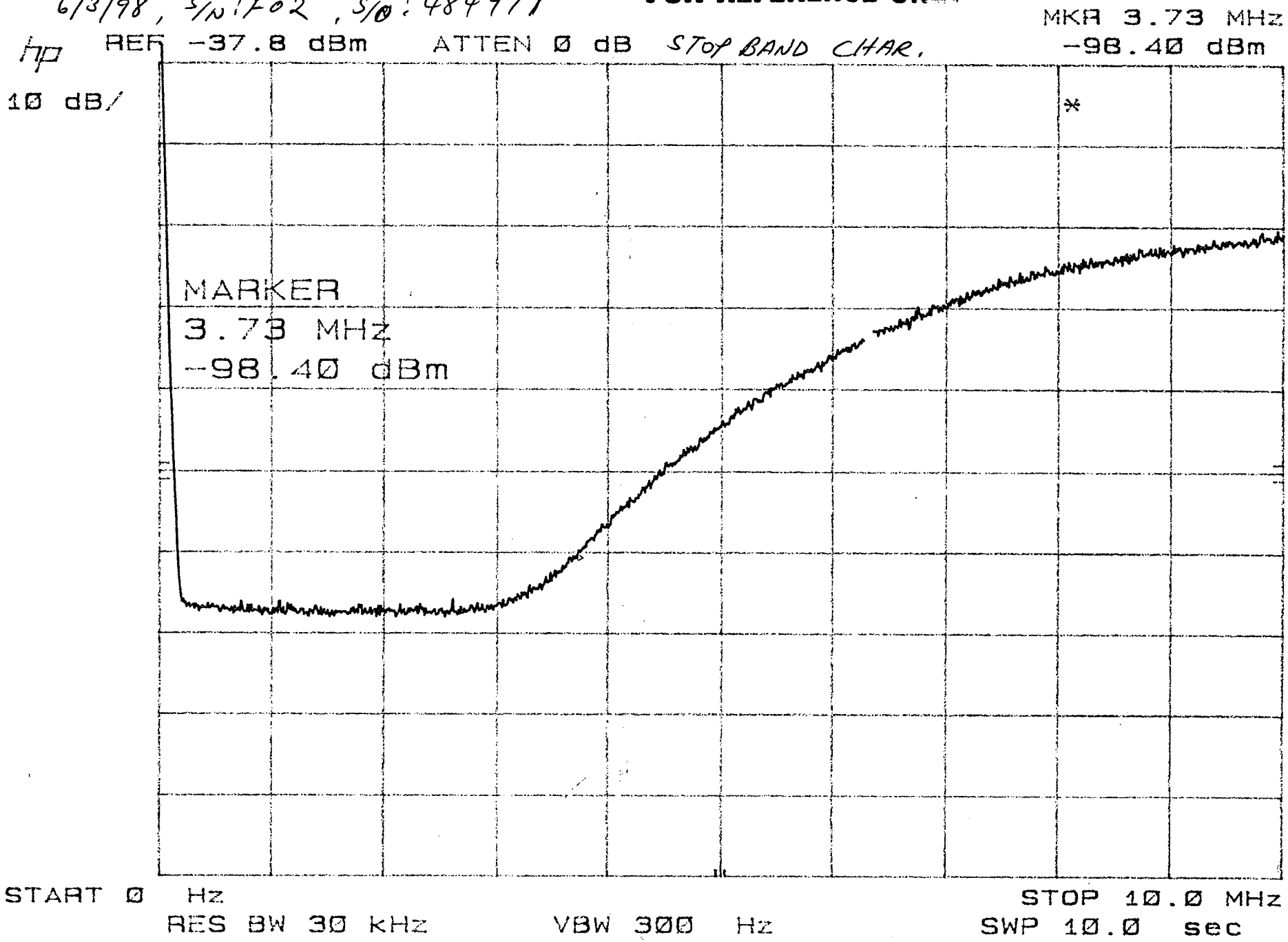
FOR REFERENCE ONLY

06/3/98 S/O: 484971 S/N: F02



6/3/98, S/N: F02, S/O: 484971

FOR REFERENCE ONLY



TEST DATA SHEET 10 (Sheet ~~1~~ of ~~10~~)

Noise Figure and Noise Power Stability Test Data (Paragraph 3.5.4) ~~(A1-1)~~

Test Setup Verified: Y. Yrink (Signature) Baseplate Temperature (T_B) 22.5 °C

Component	Channel No.	V_b(V)	I_b(mA)	T_H(°C)	V_H (V) Mean	V_H (V) Standard Deviation	T_C(°C)	V_C (V) Mean	V_C (V) Standard Deviation
LO	* 1 & 2	10.02	69.75	22.4	.92333	.000205	-194.0	.6490	.000210
				22.4	.9233	.000234	-194.0	.6499	.000356
				22.4	.9231	.000212	-194.0	.6483	.000236
				22.4	.9231	.000209	-194.0	.6478	.000316
				22.4	.9231	.000216	-194.0	.6474	.000220
				22.4	.9228	.000234	-194.0	.6485	.000392
				22.4	.9230	.000208	-194.0	.6472	.000439
				22.4	.9230	.000218	-194.0	.6483	.000366
				22.4	.9230	.000221	-194.0	.6496	.000355
				22.4	.9229	.000249	-194.0	.6486	.000370
Mixer/ Amps	All	10.02	83.62						
IF Amps	All	N/A	N/A						

Part No.: 1356441-1

Serial No.: F02

Test Engineer: Y. Yrink

Quality Assurance: (7A 190) 7/8/98

Date: 07/8/98

39 A-~~13~~ (QC 226) R. Kappes

TEST DATA SHEET 12 (Sheet 2 of 2)

Noise Figure and Noise Power Stability Test Data (Paragraph 3.5.4) (A2)

Test Setup Verified: J. Timms (Signature)

Baseplate Temperature (T_B) 24.1 °C
22.5.
T. Tyrrell 7/8/98

Channel No.	NF (dB)				NPS (K)				
	Required (Max)	Measured	Average	Pass/Fail	Required (Max)	Measured	Average	Delta	Pass/Fail
1	~~3.85~~	3.98			~~0.09~~	0.021			
		3.95				0.088			
		3.96				0.040			
		3.95				0.029			
		3.94				0.051			
		3.96				0.088			
		3.94				0.020			
		3.96				0.056			
		3.95				0.063			
		~~3.97~~				0.110			
	4.55		3.96	PASS	0.09		0.056	0.09	PASS

4.5

Pass = P, Fail = F

Part No.: 1356491-1

Serial No.: F02

Test Engineer: [signature]

Quality Assurance: [signature] 7/8/98 (7A 790)

Date: 7/8/98

[signature] 42 (QC 226) R. Kappes

FOR REFERENCE ONLY

AMSU-A TEST

AMSU-A2, CH1, S/N: F02, NF & NPS TEST DATA, 7/8/98

SEQ	TEMP_TEST	TEST TEMP	VOLTAGE	STD_DEV	NF (dB)	NPS(K)
1	WARM TEST	295.55	-.92337649	.00020455	----------	----------
2	COLD TEST	79.15	-.64959739	.00020997	3.97522673	.02116788
3	WARM TEST	295.55	-.92329461	.00023447	----------	----------
4	COLD TEST	79.15	-.64792858	.00035577	3.94954491	.08760735
5	WARM TEST	295.55	-.92313141	.00021229	----------	----------
6	COLD TEST	79.15	-.64825022	.00023567	3.95648374	.03959782
7	WARM TEST	295.55	-.92311617	.00020941	----------	----------
8	COLD TEST	79.15	-.64781590	.00031607	3.94974441	.02852216
9	WARM TEST	295.55	-.92307952	.00021605	----------	----------
10	COLD TEST	79.15	-.64739210	.00021970	3.94342045	.05053992
11	WARM TEST	295.55	-.92282171	.00023425	----------	----------
12	COLD TEST	79.15	-.64847566	.00039153	3.96354355	.08771103
13	WARM TEST	295.55	-.92302654	.00020770	----------	----------
14	COLD TEST	79.15	-.64715346	.00043861	3.94022287	.01945730
15	WARM TEST	295.55	-.92302650	.00021815	----------	----------
16	COLD TEST	79.15	-.64832981	.00036635	3.95892473	.05606385
17	WARM TEST	295.55	-.92295330	.00022125	----------	----------
18	COLD TEST	79.15	-.64761976	.00025492	3.94844319	.06302613
19	WARM TEST	295.55	-.92292135	.00024919	----------	----------
20	COLD TEST	79.15	-.64864939	.00036958	3.96519791	.11040914

CH. 1 ,126.8 MHz MHz

NOISE FIGURE AVERAGE (dB) = 3.95508741514

NOISE POWER STABILITY (K) = .0564102583209

NOISE POWER STABILITY DELTA (K) = .090951840151

NPS_MAX (K) = .110409143024 NPS_MIN (K) = .0194573028728

INTEGRATION TIME = .158

1 ~~8~~ 4 ~~4~~

TEST DATA SHEET 10 (Sheet ~~1~~ of ~~10~~) A5 ~~A1-1~~

Noise Figure and Noise Power Stability Test Data (Paragraph 3.5.4)

Test Setup Verified: T. Truong (Signature) Baseplate Temperature (T_B) 24.9 °C

Component	Channel No.	V_b(V)	I_b(mA)	T_H(°C)	V_H (V) Mean	V_H (V) Standard Deviation	T_C(°C)	V_C (V) Mean	V_C (V) Standard Deviation
LO	* 1 ~~8~~	10.02	69.8	22.4	-1.005	.000254	-194.0	-.7331	.000171
				22.4	-1.005	.000237	-194.0	-.7336	.000180
				22.4	-1.005	.000226	-194.0	-.7342	.000205
				22.4	-1.006	.000229	-194.0	-.7344	.000205
				22.4	-1.006	.000246	-194.0	-.7342	.000206
				22.4	-1.006	.000257	-194.0	-.7354	.000152
				22.4	-1.008	.000237	-194.0	-.7362	.000207
				22.4	-1.008	.000237	-194.0	-.7369	.000182
				22.4	-1.009	.000272	-194.0	-.7378	.000192
				22.4	-1.009	.000239	-194.0	-.7375	.000202
Mixer/ Amps	All	10.01	84.0						
IF Amps	All	N/A	N/A						

1356441-1

Part No.: ~~484977~~ T.T 6/17/98

Serial No.: F02

Test Engineer:

Quality Assurance: QC 229 7/20/98

Date: 6/17/98

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3 4

TEST DATA SHEET 12 (Sheet 2 of 3)

Noise Figure and Noise Power Stability Test Data (Paragraph 3.5.4) (A2)

Test Setup Verified: T. Thurmy (Signature) Baseplate Temperature (T_B) 24.9 °C

Channel No.	NF (dB) Required (Max)	NF (dB) Measured	NF (dB) Average	NF (dB) Pass/Fail	NPS (K) Required (Max)	NPS (K) Measured	NPS (K) Average	NPS (K) Delta	NPS (K) Pass/Fail
1	~~3.85~~	4.38			~~0.09~~	0.09			
		4.38				0.04			
		4.39				0.01			
		4.39				0.03			
		4.38				0.08			
		4.39				0.09			
		4.39				0.06			
		4.40				0.06			
		4.40				0.12			
		4.39				0.06			
	4.55		4.39	P	.09		0.07	0.11	P

Pass = P, Fail = F

Part No.: 1356441-1 ~~48497~~ 7.T 6/17/98

Serial No.: F02

Test Engineer: T. Thurmy

Quality Assurance: QC 229 7/20/98

Date: 6/17/98

QC 226 R. Kapper

TEST DATA SHEET 10 (Sheet ~~1~~ of ~~10~~)

Noise Figure and Noise Power Stability Test Data (Paragraph 3.5.4) ~~(A1-1)~~

Test Setup Verified: Y. Trinh (Signature)

Baseplate Temperature (T_B) 24.4 °C

Component	Channel No.	V_b(V)	I_b(mA)	T_H(°C)	V_H (V) Mean	V_H (V) Standard Deviation	T_C(°C)	V_C (V) Mean	V_C (V) Standard Deviation
LO	2	10.02	128.3	22.5	-.87467	.000252	-194.0	-.57056	.000258
				22.5	-.87451	.000254	-194.0	-.56876	.000241
				22.5	-.87472	.000276	-194.0	-.57001	.000285
				22.5	-.87487	.000233	-194.0	-.57013	.0002259
				22.5	-.87483	.000259	-194.0	-.56992	.0003097
				22.5	-.87490	.000250	-194.0	-.56721	.000208
				22.5	-.87489	.000250	-194.0	-.56721	.000278
				22.5	-.87492	.000251	-194.0	-.5682	.000242
				22.5	-.87506	.000258	-194.0	-.56734	.000318
				22.5	-.87505	.000272	-194.0	-.56715	.000393
Mixer/ Amps	All	10.01	84.0						
IF Amps	All	N/A	N/A						

Part No.: 484971

Serial No.: F02

Test Engineer: Y. Trinh

Quality Assurance: Richard Stutt 6/18/98 (7A 190)

Date: 06/3/98

40 (QC 226) R. Kappes

TEST DATA SHEET 12 (Sheet ~~3~~ of 3)

Noise Figure and Noise Power Stability Test Data (Paragraph 3.5.4) (A2)

Test Setup Verified: Y. Yinh
Signature

Baseplate Temperature (T_B) 24.6 °C

Channel No.	NF (dB) Required (Max)	NF (dB) Measured	NF (dB) Average	NF (dB) Pass/Fail	NPS (K) Required (Max)	NPS (K) Measured	NPS (K) Average	NPS (K) Delta	NPS (K) Pass/Fail
2	~~3.55~~	3.28			~~0.09~~	0.041			
		3.25				0.047			
		3.27				0.09			
		3.27				0.054			
		3.27				0.060			
		3.23				0.035			
		3.23				0.033			
		3.24				0.035			
		3.23				0.057			
		3.23				0.082			
	4.20		3.25	P	0.09		0.053	0.058	P

3.95

Pass = P, Fail = F

Part No.: 484971

Serial No.: F02

Test Engineer: Y. Yinh

Quality Assurance: [signature] 6/8/98 (7A 190)

Date: 06/3/98

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06/3/98 S/O: 484971 **FOR REFERENCE ONLY**

AMSU-A TEST

AMSU-A2, S/N: F02, CH2, NF & NPS TEST DATA 6/3/98

SEQ	TEMP_TEST	TEST TEMP	VOLTAGE	STD_DEV	NF (dB)	NPS(K)
1	WARM TEST	295.65	-.87466939	.00025198	----------	----------
2	COLD TEST	79.15	-.57056018	.00025835	3.27915686	.04071343
3	WARM TEST	295.65	-.87450806	.00025425	----------	----------
4	COLD TEST	79.15	-.56876293	.00024094	3.25483466	.04719068
5	WARM TEST	295.65	-.87471507	.00027631	----------	----------
6	COLD TEST	79.15	-.57001331	.00028520	3.27085435	.09020299
7	WARM TEST	295.65	-.87486699	.00023332	----------	----------
8	COLD TEST	79.15	-.57012820	.00022594	3.27108299	.05416052
9	WARM TEST	295.65	-.87482569	.00025972	----------	----------
10	COLD TEST	79.15	-.56991708	.00030966	3.26843440	.06027504
11	WARM TEST	295.65	-.87490328	.00025033	----------	----------
12	COLD TEST	79.15	-.56720512	.00020834	3.22890622	.03453138
13	WARM TEST	295.65	-.87489411	.00024980	----------	----------
14	COLD TEST	79.15	-.56720546	.00027844	3.22899577	.03258535
15	WARM TEST	295.65	-.87492231	.00025051	----------	----------
16	COLD TEST	79.15	-.56816608	.00024200	3.24243970	.03525605
17	WARM TEST	295.65	-.87505596	.00025836	----------	----------
18	COLD TEST	79.15	-.56734261	.00031804	3.22945461	.05660204
19	WARM TEST	295.65	-.87504915	.00027181	----------	----------
20	COLD TEST	79.15	-.56714673	.00039314	3.22672827	.08201884

CH. 2 ,80.4 MHz MHz

NOISE FIGURE AVERAGE (dB) = 3.25013483616

NOISE POWER STABILITY (K) = .0533536319268

NOISE POWER STABILITY DELTA (K) = .057617642447

NPS_MAX (K) = .0902029877624 NPS_MIN (K) = .0325853453154

INTEGRATION TIME = .158

TEST DATA SHEET 18

Temperature Sensor and Thermistor Test Data (Paragraph 3.6.1) (A2)

Test Setup Verified: Y. Yrink (Signature) Baseplate Temperature (T_B) 22.2 °C

Reference Designation	Specification	Measured Value		Pass/Fail
RT 12	2200 ± 100 Ω	2175	Ω	P
RT 19	2200 ± 100 Ω	2170	Ω	P
RT 20	2200 ± 100 Ω	2170	Ω	P
RT 13	2200 ± 100 Ω	2174	Ω	P
RT 14	2200 ± 100 Ω	2171	Ω	P
RT 17	2200 ± 100 Ω	2171	Ω	P
TB 58	3000 ± 100 Ω	3002	Ω	P
TB 59	3000 ± 100 Ω	3003	Ω	P
TB 53	4.1 – 4.6 V	4.35	V	P

Pass = P, Fail = F

Part No.: 1356441-1

Serial No.: F02

Test Engineer: Y. Yrink

Quality Assurance: QC 229 7/20/98

Date: 06/2/98

MAR 30 '98 51 QC 229 R. Kappes

TEST DATA SHEET 22

Survival Heater and Thermal Switch Test Data (Paragraph 3.6.3) (A2)

Test Setup Verified: T. Trinh
Signature

Baseplate Temperature (T_B) 22.2 °C

Reference Designation	Open Switch		Closed Switch		
	>10 MΩ	Pass/Fail	Specification	Measured Value	Pass/Fail
HR1/TS1	>50 MΩ	P	50 - 65 Ω	54.2 Ω	P
	>50 MΩ	P		54.2 Ω	P
HR2/TS2	>50 MΩ	P		55.7 Ω	P
	>50 MΩ	P		55.7 Ω	P

Pass = P, Fail = F

Part No.: 1356441-1

Serial No.: F02

Test Engineer: T. Trinh

Quality Assurance: QC 229 7/20/98

Date: 06/2/98

TEST DATA SHEET 23 (Sheet 3 of 3)
Bias Voltage Verification Test Data (Paragraph 3.6.4) (A2)

Test Setup Verified: T. Trinh
Signature

Baseplate Temperature (T_B) 22.4 °C

Reference Designation	Specification	Measured Value (V)	Pass/Fail
Mixer/IF AMP Ch 1, 2	+10 ±0.1	10.0 V	P
DRO Ch 1	+10 ±0.1	10.01 V	P
DRO Ch 2	+10 ±0.1	10.01 V	P

Part No.: 1356441-1

Serial No.: F02

Test Engineer: T. Trinh

Quality Assurance: QC 229 7/20/98

Date: 06/2/98

MAR 30 '98

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Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
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4. Title and Subtitle	5. Report Date
Integrated Advanced Microwave Sounding Unit-A (AMSU-A), Performance Verification Report	July 1998
	6. Performing Organization Code: ---
7. Author(s): R. Kapper	8. Performing Organization Report No.: 11193
	10. Work Unit No.: ---
9. Performing Organization Name and Address: Aerojet, 1100 W. Hollyvale, Azusa, CA 91702	11. Contract or Grant No.: NAS 5-32314
	13. Type of Report and Period Covered: Final
12. Sponsoring Agency Name and Address: NASA, Goddard Space Flight Center, Greenbelt, Maryland 20771	14. Sponsoring Agency Code: ---

15. Supplementary Notes

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16. ABSTRACT (*Maximum 200 words*)

This is the Performance Verification Report, METSAT AMSU-A2 Receiver Assembly, P/N 1356441-1, S/N F02 for the Integrated Advanced Microwave Sounding Unit-A (AMSU-A).

17. Key Words (Suggested by Author(s))	18. Distribution Statement
EOS Microwave System	Unclassified --- Unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of pages	22. Price
Unclassified	Unclassified		---

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4. TITLE AND SUBTITLE	5. FUNDING NUMBERS
Integrated Advanced Microwave Sounding Unit-A (AMSU-A), Performance Verification Report	NAS 5-32314
6. AUTHOR(S) R. Kapper	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Aerojet 1100 W. Hollyvale Azusa, CA 91702	8. PERFORMING ORGANIZATION REPORT NUMBER 11193 July 1998
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) NASA Goddard Space Flight Center Greenbelt, Maryland 20771	10. SPONSORING/MONITORING AGENCY REPORT NUMBER ---
11. SUPPLEMENTARY NOTES ---	
12a. DISTRIBUTION/AVAILABILITY STATEMENT ---	12b. DISTRIBUTION CODE ---

13. ABSTRACT (*Maximum 200 words*)

This is the Performance Verification Report, METSAT AMSU-A2 Receiver Assembly, P/N 1356441-1, S/N F02 for the Integrated Advanced Microwave Sounding Unit-A (AMSU-A).

14. SUBJECT TERMS	15. NUMBER OF PAGES
EOS Microwave System	16. PRICE CODE ---

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
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Performance Verification Report METSAT AMSU-A2 Receiver Assembly	Report 11193 July 1998

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R. Kapper	208	

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Systems Engineer (R. Platt) R H Platt	8311	7/29/98
Design Assurance (E. Lorenz) E. Lorenz	8331	7/29/98
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